Titan User's Guide

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FOREWORD

The Center for Information Technology (CIT) provides and supports central computing resources for use by NIH and by a number of other government agencies. CIT operates the NIH Computer Center to provide its customers with OS/390 mainframe (Titan), Unix (EOS), and Windows application hosting, enterprise-wide e-mail, and scientific computing resources. CIT provides interoperability among these resources and with other computing facilities.

Titan serves many of our customers as an efficient, reliable, and economical mainframe processing environment. Its reduced dependence on highly customized software allows quicker adoption of new technologies. We have now completed the transition of the South System to Titan, bringing Titan's benefits to all of our mainframe customers.

The *Titan User's Guide* serves as the primary reference for information about the Titan system and also introduces some of the other services offered by CIT. The *Titan User's Guide* includes information on policies, standards of service, and administrative information—such as registration, security, documentation, and charges—as well as connectivity, major systems and development facilities, printing, networks, storage and backup of data, and hardware facilities. In addition, there are references to other resources that provide more detailed, technical information on specific computing topics. Use this manual in conjunction with the Web site http://datacenter.cit.nih.gov.

To stay informed about recent changes, be sure to subscribe to *Titan News* and the Web-based periodical, *Interface* (through the NIH Listserv lists "CIT-Titan-News" and "Interface"). We are here to support you in fulfilling your organization's missions and goals. Please let us know how we can better serve you.

John Dickson, Ph.D., Director
Division of Computer System Services, CIT

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1 ORIENTATION

The *Titan User's Guide* is published and maintained by the Center for Information Technology, for those who use the Titan mainframe (OS/390) system of the NIH Computer Center. It describes the services, registration, standards, security-related issues (See Section 4), where to go for additional information, and guidance on who to contact for assistance. Refer to the manual *Titan Batch Processing* for information on batch processing and job control language (JCL) for the Titan system. See Section 5.4 for information on ordering documentation.

Visit the CIT Titan system on the Web at:

http://datacenter.cit.nih.gov

For information on the Titan transition from the previous CIT mainframe systems refer to:

http://silk.nih.gov/silk/titan

Other enterprise application hosting systems—EOS, a Unix-based system for general applications; and Windows Server Services—are only briefly described in this document. Please contact the CIT Technical Assistance and Support Center (TASC) for further information about the Unix and Windows platforms.

Any questions about the content or meaning of information in the *Titan User's Guide* should be directed to the TASC help desk. The location and telephone number for the TASC help desk and other important groups can be found in Section 1.3.1.

Between updates to this manual, users are informed of changes through CIT's online resources including:

- *Titan News*, an online mail facility. Join the NIH Listserv list "CIT-Titan-News" at http://list.nih.gov/archives/cit-titan-news.html.
- *Interface*, a Web-based periodical. To subscribe to *Interface Online* via Listserv or to order the printed version, go to http://datacenter.cit.nih.gov/interface.
- CIT Web pages (http://cit.nih.gov)

These resources announce changes in CIT policies and standards of service, as well as all significant modifications to hardware and software on various platforms at the NIH Computer Center. This version of the *Titan User's Guide* is updated through *Interface* Number 229, March 2004 and the *Titan News* online newsletter of June 1, 2004.

New and prospective customers may obtain the latest issue of *Interface* from the TASC help desk. For CIT publication services, visit:

http://publications.cit.nih.gov

1.1 CIT (CENTER FOR INFORMATION TECHNOLOGY)

CIT provides a variety of data processing services on a cost-recovery basis to the NIH and other government agencies, and also conducts research and development related to the application of computer methodology to biomedical research.

As part of its mission, CIT:

- provides data processing and high-performance computing facilities, integrated telecommunications data networks, and services to HHS and other federal agencies
- establishes and operates the necessary organization and infrastructure to assure security, connectivity, and interoperability across the NIH
- operates a state-of-the-art regional computer facility
- provides leadership for determining NIH's computational and telecommunications needs and oversees development of infrastructure support
- develops NIH information technology policy to implement policy and legislation
- provides policy and standards leadership within NIH by identifying and communicating NIH information technology issues, problems and solutions

This section briefly describes some of the components of the Center for Information Technology.

For more information on CIT visit:

http://cit.nih.gov

For a directory of useful Web addresses, see Section 6.5.2.

1.1.1 Office of the Deputy Chief Information Officer (ODCIO)

The Office of the Deputy Chief Information Officer advises the Chief Information Officer (CIO) on the direction and management of significant NIH IT program and policy activities under relevant federal statutes, regulations and policies. It also develops, implements, manages, and oversees NIH IT activities related to IT legislation, regulations, and NIH and other federal policies such as acquisition, automated information systems security, information collection, the Freedom of Information Act, and the Privacy Act.

ODCIO directs NIH's IT capital planning processes with regard to major IT investments, and provides leadership to NIH Institutes and Centers (ICs) to enhance and strengthen their IT program management so they comply with legislative and policy requirements. The ODCIO serves as the principal NIH liaison to the HHS, its OPDIVs, and other federal agencies on IT matters. The ODCIO identifies critical IT issues and analyzes, plans, leads, and manages the implementation of special HHS or federal initiatives as they relate to the management of NIH's IT resources. ODCIO also collaborates with NIH managers responsible for IT-related functions.

1.1.2 Division of Computer System Services (DCSS)

The Division of Computer System Services operates enterprise-wide e-mail services for NIH, Web services, and administers the NIH Computer Center for enterprise and scientific computing. DCSS plans, implements, operates, and supports centrally owned or administered computing resources for NIH enterprise use, ensuring interoperability among those resources and between them and other computing facilities owned by customer organizations. DCSS operates the Helix and ALW systems for NIH scientists. The division promotes awareness and efficient and effective use of these computing resources by customer personnel through training, presentations, consultations, and documentation.

DCSS investigates new and emerging computing requirements of customer programs. It conducts research and development to identify, evaluate, and adapt new computer architectures and technologies to meet identified customer requirements and to enhance current service offerings. Additionally, where appropriate, DCSS manages and operates departmental computing resources for IC, office, or division use.

Customers can access scientific and administrative data and applications, as well as develop new applications to meet the needs of an office, an agency, a lab, or a worldwide community of collaborators using the computing environment and platform most suitable for their applications.

For more information on all these systems, visit:

http://datacenter.cit.nih.gov

1.1.2.1 Application Hosting on Enterprise Systems

Designated as a HHS consolidated data center, the NIH Computer Center offers full-service enterprise application hosting on the NIH Computer Center's mainframe (Titan), Unix (EOS), and Windows servers as well as colocation services for customer-owned servers.
Both full-service application hosting and colocation services offer:

- physical security
- redundant, high-bandwidth connectivity
- reliable infrastructure—climate control, UPS (uninterruptible power source)
- operations staff on-site, 24 x 7

The NIH Computer Center can host enterprise applications for NIH and other government agencies.

In general, the NIH Computer Center operates on a fee-for-service basis; that is, charges to customers are based on the resources they use. The economies of scale, possible in a complex

as large as the NIH Computer Center, have resulted in computing costs declining significantly or remaining unchanged over the last 30 years.

The NIH Computer Center supports both network and dialup connections. NIHnet, supported by CIT, is the NIH backbone network that interconnects the Institutes and Centers (ICs), local area networks (LANs), and the NIH Computer Center with the Internet, Internet2, HHS operating divisions, and other government agencies.

Colocation Services
The NIH Computer Center supports colocation services for customer-owned servers. Many organizations already own their own servers for hosting applications but find that they are simply running out of floor space or they lack the resources (e.g., security, redundant power, and connectivity) to house their servers properly. To address this problem, CIT offers on-site and off-site colocation—housing customers' servers in a secure, climate-controlled environment. For more information, visit:

http://datacenter.cit.nih.gov/colocation

Full-service Hosting
Full-service application hosting on our secure, well-managed, central servers running OS/390 (Titan), Unix (EOS), or Windows provides:

- security validated by a yearly SAS 70 audit—saving customers the expense of an additional audit
- firewall and intrusion detection services, penetration testing, security assessments
- maintenance and backups for your files
- a disaster recovery program available for your critical applications
- comprehensive change management
- redundant hardware and software in critical areas
- 24 x 7 system monitoring and problem resolution
- multiple platforms
- all server maintenance
- access to data on other systems
- dedicated application coordinators to help our customers

To assist users with the full extent of services, CIT provides consulting, training, and documentation. This manual is intended to provide users with a general description of what the Titan system offers and how to use it effectively.

Besides Titan, other components of the enterprise systems include:

EOS (Unix)
The EOS systems provide a stable application hosting and data-repository environment for database and information systems using a variety of servers. EOS is a Unix-based environment that hosts a variety of production and development applications at the NIH Computer Center. For more information, refer to the *EOS User's Guide*, available from the CIT publication service.

Operating systems:

- Tru64 UNIX
- Sun Solaris Operating System

Installed software (commercial):

- DEC COBOL
- DEC C
- DEC C++
- Apache HTTP server
- Net8 (formerly SQL*Net)
- Netscape Enterprise Server
- Oracle hosting services
  - Oracle Web Server
  - Oracle Application Server (Middle Tier)

Database:

- Hosting Oracle databases and Middle Tier instances on shared or dedicated Unix servers

Windows Server Services
Windows-based applications can be hosted on CIT servers that are carefully managed and monitored on a 7x24 basis. The Windows servers provide a computing environment suitable for critical enterprise-wide applications.

We support the major components of the Microsoft Back Office Server Suite. The applications supported include Terminal Server, SQL Server 2000, Exchange, and IIS in our enterprise wide environment. We provide these services in both a shared and dedicated server service. In addition, the NIH Computer Center supports ColdFusion in both a shared and dedicated Web environment.

The Windows servers provide the hosting environment for the CIT Web content management system (CMS), which is a shared Web service. CIT's CMS service uses Microsoft’s Content

Management Server application. The Division of Enterprise and Customer Applications provides the application development for the CIT CMS service.

For additional information, go to:

http://wintelhosting.cit.nih.gov

Other Services:

- Central Email Service (CES) providing e-mail services for the NIH community
- NBARS, a mainframe-based service using TSM software, providing backup and recovery for distributed data (see Section 10.3)
- disaster recovery program for disaster recovery facilities and services for "critical" applications that run on the Titan and EOS systems (see Section 4.5)
- Search engine services for NIH Web sites using Google

1.1.2.2 Helix Systems

The NIH Helix Systems manage high-performance computing systems for the NIH intramural scientific community. The front-end SGI Origin 2400 system (with the network name helix) is used for many scientific applications as well as general purpose tasks, such as reading mail, transferring files and Web browsing.

Additional systems offer special computational capabilities that enable compute-intensive scientific applications to run faster or more efficiently. An SGI Origin 3400 (nimbus.nih.gov) augments helix by running specific scientific applications or user programs that require long execution times. The SGI systems run the IRIX operating system. The NIH Biowulf Cluster (biowulf.nih.gov) is a Beowulf parallel processing system that currently has over 1800 processors. Biowulf was built by members of the Helix Systems staff and runs the Redhat Linux operating system.

In addition to the standard Unix tools for software development, text formatting, and network communications, software packages for the Helix System include:

Scientific applications:

- BioInformatics: GCG, Fasta, Blast, ClustalW, BoxShade, Pfsearch, HMMer, BLAT, MUMmer. RepeatMaster
- Structural Biology: X-Plor, Quest, Gaussian, Charmm, GAMESS, NAMD, CNS
- Molecular Modeling: AMBER, Charmm, DOCK, Fdiscover, LOOK, Insight, NAOMI, Sybyl; available on helix through MMIGNET
- Mathematical/Graphical Analysis: Mathematica, MATLAB, S-PLUS, IMSL, xmgr, Xplot, GAUSS, Physica

- Image Analysis: Analyze, AnalyzeAVW, AVS, IDL, xv, imgworks, convert, GIMP, GPHIGS, PHIGURE
- Molecular Graphics: Grasp, Molscript, Molauto, PovChem, Povscript, PovRay, Ribbons

Biological Databases:

- GenBank: nucleic acid sequences
- PIR: protein sequences
- Genpept: protein translations from Genbank
- SwissProt: curated and highly annotated protein sequence database
- Human & Mouse Genome Assemblies: chromosome and annotation
- PDB: protein structures
- Cambridge Structural Database: small organic and organometallic molecules

Programming Language/Tools:

- C, FORTRAN 77, Fortran 90, Lisp, gcc, C++, and other typical Unix tools like awk and perl
- MPI library, batch systems
- Static analyzer, debugger, and performance analyzer tools

Subroutine Libraries:

- IMSL: mathematical and statistical routines
- FIGARO: 2- and 3-d interactive graphics routines

Network Services:

- mail, pine, and Emacs rmail: e-mail readers
- SquirrelMail: Web access to Helix e-mail
- ssh: secure encrypted communications between two systems
- ftp: Internet file transfer utility
- kermit: file transfer via modem
- X Window System: supports X-windows scientific applications such as S-PLUS, Mathematica, MATLAB, SeqLab
- netscape and lynx: Web browsers
- tin, rn, xrn: newsgroup reader
- WebTermX: Web browser plug-in that lets Windows PCs run the X Window System
- eXodus: X Windows System for Macintosh

Editors:

- pico, vi, jot, nedit, xedit, and GNU Emacs: full-screen editors
- ed and ex: line editors

Web-based Services: http://helix.nih.gov/webapps

- Xwindows: Graphics applications run on helix can be displayed on a desktop Mac or PC
- Scientific applications: GCG-Lite, Molecules R Us, SeqWeb, UCSC Genome Browser mirror, and other Web interfaces to scientific tools
- Literature Searching: Web of Science, a citation-oriented database of scientific literature—contains the Science Citation Index Expanded and the Social Science Citation Index Expanded
- Proteomics: Mascot Mass-Spectroscopy search engine
- Porpoise: automatic alert service for new scientific literature that searches the weekly updates of the Web of Science
- WHALES: automatic alert service for new sequences in the major nucleotide and protein databases
- NIH Directory and Email Forwarding Service

Use the CIT publication service to order manuals for the Helix Systems.

The Helix systems are restricted to NIH use. For additional information about the Helix Systems, go to:

http://helix.nih.gov

http://biowulf.nih.gov

http://biowulf.nih.gov/apps/

1.1.2.3 ADVANCED Laboratory Workstation (ALW) System

CIT provides network-based support for general purpose, open, distributed computing via the Advanced Laboratory Workstation (ALW) System Customer-owned Unix workstations connect to a world-wide distributed file system (AFS) via NIHnet, the NIH wide area network, to access shared resources and services such as file backup, software maintenance, security monitoring, scientific and office applications, licensed software and freeware, online documentation, and the Internet.

The ALW staff performs the system administration. They frequently upgrade and test software and system patches before releasing them to a particular platform. Once it is released, the software updates automatically on the workstation overnight, allowing users to concentrate on their research.

Support for the ALW system is available through the TASC help desk or the ALW System's PTR (Problem Tracking and Reporting) system.

ALW System workstations are particularly suitable for scientific applications requiring high performance desktop computing or graphics, or access to large amounts of data. These workstations are manufactured by a variety of vendors.

The most popular applications include medical image processing, DNA and protein sequencing and searching, statistical analysis, and molecular graphics and modeling. Applications offered include:

- genomic sequence analysis packages
- image processing
- mathematics packages
- molecular modeling
- statistical packages
- office automation applications
- other software

Additional information about the ALW System is available on the Web at:

http://www.alw.nih.gov

1.1.3 Division of Computational Bioscience (DCB)

The Division of Computational Bioscience (DCB) of CIT is a research and development organization that provides scientific and technical expertise in computational science and engineering to support the NIH Intramural Research Program (IRP). Working with all of the Institutes and the Clinical Center, DCB applies the concepts and technologies of computer science, engineering, physical science and mathematics to biomedical applications including the areas of image processing, biomedical informatics, genetic databases, structural biology, scientific visualization, medical imaging, telemedicine, signal processing, biomedical instrumentation, and biomathematics. DCB develops computational methods and tools for solving biomedical laboratory and clinical research problems and manages centralized scientific computational and communication systems. DCB also provides an environment to mentor computational scientists and engineers for careers in biomedical research.

1.1.4 Division of Enterprise and Custom Applications (DECA)

Application or software development is a risky, often complex, and difficult undertaking. Success in developing useful software requires a staff with multiple advanced skills and experience. DECA's highly trained staff includes certified project managers, with years of NIH experience, who understand the specialized requirements of the NIH environment and are able to translate NIH's tried and true best practices into products that work.

DECA takes a leadership role in the development, support, and maintenance of enterprise systems at NIH. (Enterprise systems are those IT systems that are broadly based, either in size or influence, and that used widely throughout an agency.) NIH has three such system areas: administrative systems, grants management systems, and clinical information systems. CIT, through DECA, partners with the managers of each of these systems.

1.1.5 Division of Network Systems and Telecommunications (DNST)

The Division of Network Systems and Telecommunications directs the engineering, design, implementation, and support of network infrastructure and services for the NIH wide area network (NIHnet) to facilitate the use of scientific, administrative, and other business applications. The Division manages and directs NIH telecommunications systems and develops technical requirements for the NIH ICs and implements telecommunications programs to meet the needs of the NIH community.

DNST researches, develops, and tests next-generation networking/telecommunications technologies and develops and supports applications using new network technologies, such as telemedicine and video conferencing. It provides consulting, guidance and support to the ICs, helping them to meet their network requirements. To improve the information infrastructure on networking/telecommunications activities, DNST serves as liaison to the NIH ICs and other HHS components.

DNST provides cost effective and reliable video and wireless services for the NIH and HHS; provides a robust cost efficient and scalable cabling plant to support multimedia services at the NIH; and facilitates the implementation of Federal Telecommunication System services. DNST assists NIH customers in implementing video conferencing and video streaming solutions. DNST provides two-way radio services that meet the requirements of the NIH public safety and facilities maintenance communities; and facilitates the implementation of Federal Telecommunication System services.

The Division manages the cable plant facilities and the physical environment of the communications infrastructure. It collaborates with application developers to design general-purpose software tools that provide end user interfaces to the cable database system; and provides direct end user support for cable database questions and concerns.

DNST serves as the focal point for telecommunications service orders, and develops and disseminates recommended standards, policies, and procedures for the nationwide implementation and management of NIH networking and telecommunications systems. DNST also develops, implements, and supports remote access services to NIHnet, technical support for wireless services, and a 24-hour telephone/network support service.

1.1.6 Division of Customer Support (DCS)

The Division of Customer Support provides centralized, integrated computer support services to the NIH computing community. DCS advocates customer needs to CIT management and represents services and policies to CIT's customers. It plays an active and participatory role in supporting desktop computing to the end user in the areas of software and hardware, including Internet, telecommunications, and access technologies. DCS also coordinates and oversees CIT's Training Program for the benefit of the NIH computing community. In addition to providing a central account establishment and management services for access to CIT systems, DCS manages an NIH-wide help desk and implements service request systems.

The Division of Customer Support is responsible for providing statistical and mathematical software (available on several platforms) training on the use of the software, statistical advice, and interpretation of output. This service is readily available for the support of all computer users employed by the ICs (Institutes and Centers) of the NIH community, as well as those employed by other government agencies and/or representatives of organizations that are under contract to perform government work. The program library includes the following software packages that run on Titan:

- BASE SAS - foundation of the SAS system (see Section 7.6.1)
- BMDP - Biomedical computer programs (P series)
- IMSL - International Mathematical and Statistical Library
- MSTAT1 - mathematical and statistical FORTRAN subroutines
- SAS/ACCESS Software for Relational Databases - DB2 Interface
- SAS/ACCESS Software for Relational Databases - Oracle interface
- SAS/AF - application facility
- SAS/CONNECT - cooperative processing product
- SAS/EIS - tool to build graphical user interface applications
- SAS/ETS - econometric and time series procedures
- SAS/FSP - full screen procedures
- SAS/GRAPH - SAS graphic subsystem
- SAS/IML - Interactive Matrix Language
- SAS/OR - operations research tools
- SAS/QC - SAS quality control
- SAS/SHARE - provides concurrent access to data
- SAS/STAT - advanced statistics procedures
- SPSS - Statistical Package for the Social Sciences
- SUDAAN - Survey Data Analysis

1.2 MAPS AND DIRECTIONS

The NIH Computer Center and its associated offices are in buildings 12, 12A, and 12B on the NIH campus at 9000 Rockville Pike, Bethesda, Maryland 20892. The second primary location for the Center for Information Technology is located at 10401 Fernwood Road, Bethesda, Maryland 20817, a few miles northwest of the main NIH campus.

The map below is an abstract illustration of the NIH Campus showing the general locations of the buildings, parking areas, and main roads. Parking is extremely limited; visitors are encouraged to use public transportation.

Note: Due to security measures, access to the campus is limited. Admittance requires a government ID or security screening for non-government personnel. Please refer to:

http://www.nih.gov/about/visitorsecurity.htm

for the most current access information.

Figure 1-1. Map of the NIH Campus

Figure 1-2. Map of Washington Area

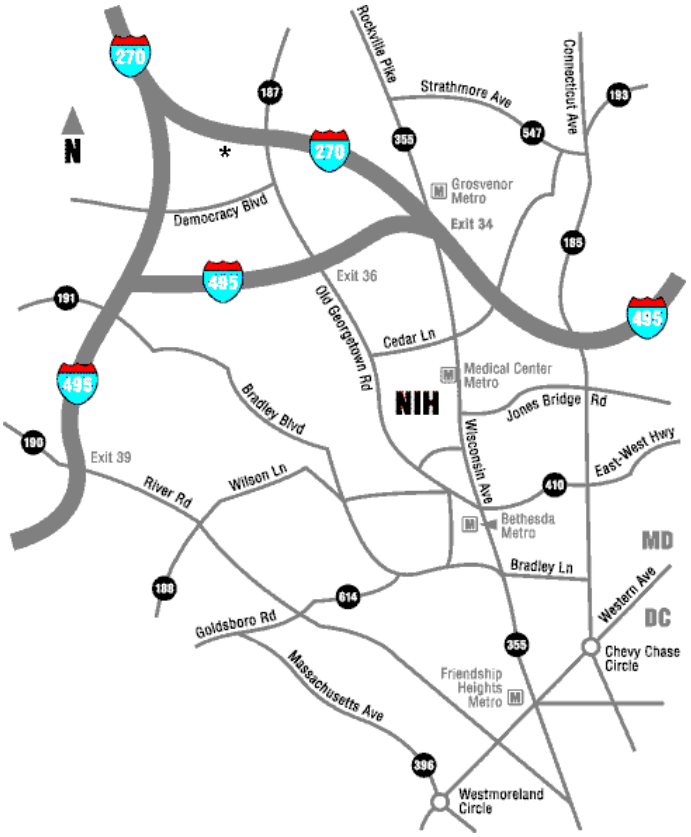


Figure 1-3. Map of NIH Building 12A

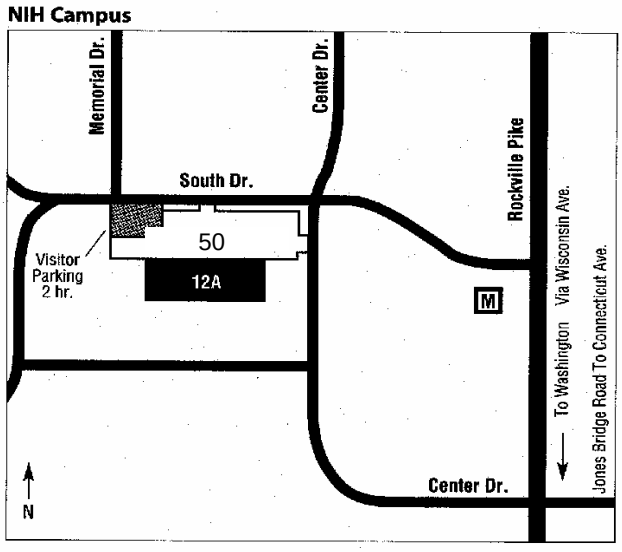
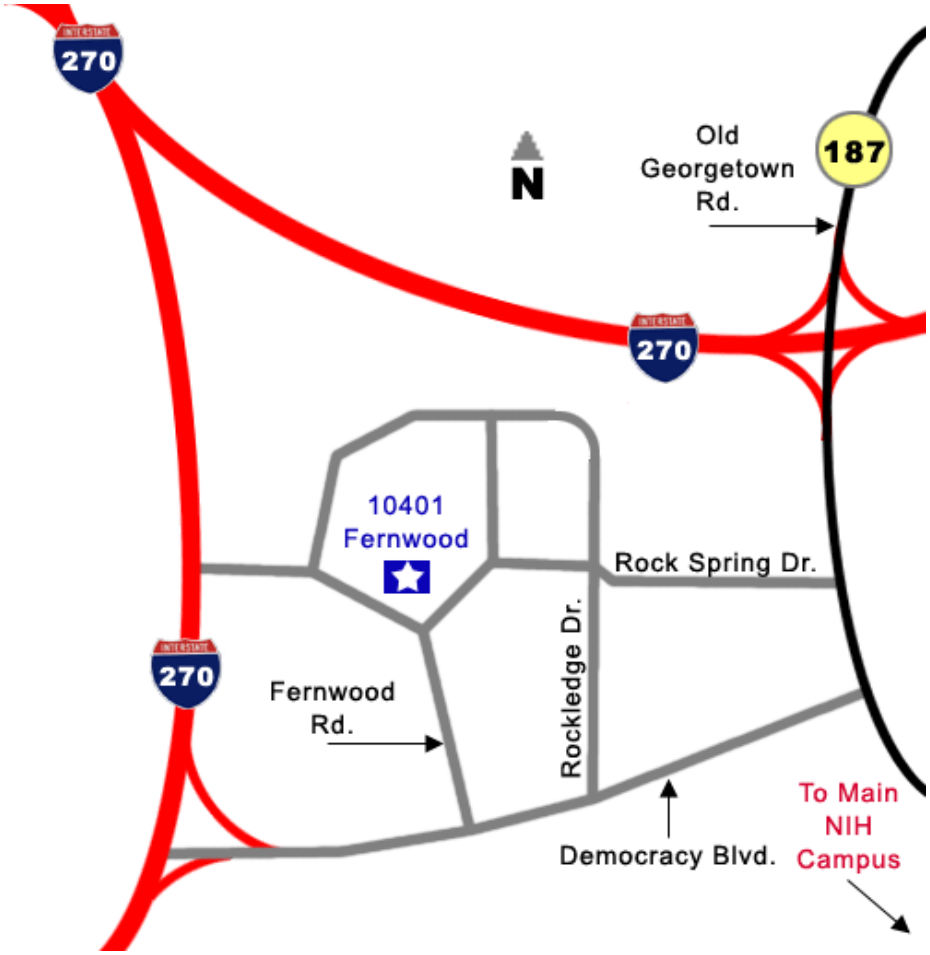


Figure 1-4. Map of Fernwood Building



Directions to the NIH Computer Center

By subway:

- Take the Metrorail Red Line to Medical Center stop.
- Continue walking forward down South Drive after getting off the escalator.
- Cross the intersection of Center Drive (stop sign). The NIH Computer Center (building 12A) is on the left behind building 50.

See map for Metrorail.

By car:

Interstate 495 Westbound

- Take exit 33B Connecticut Avenue (Chevy Chase).
- Turn left onto Connecticut Avenue.
- At first traffic light, Jones Bridge Road, turn right.
- Turn right on Rockville Pike and drive .2 of a mile on Rockville Pike. Turn left into the main entrance of the National Institutes of Health on South Drive. Go approximately .2 of a mile just past Center Drive
- The NIH Computer Center (building 12A) is on the left, behind building 50.

Interstate 495 Eastbound

- Take exit 34B Wisconsin Avenue/Bethesda.
- Drive approximately two miles south on Rockville Pike.
- At the fourth traffic light, South Drive, turn right into the main entrance of the National Institutes of Health.
- Go approximately .2 of a mile just past Center Drive
- The NIH Computer Center (building 12A) is on the left, behind building 50.

Interstate 270 (from Gaithersburg)

- Take I-270 to Rte. 495 Washington (East).
- Exit Rte. 495 at Rte. 355 (Wisconsin Avenue).
- Drive approximately two miles south on Rockville Pike.
- At the fourth traffic light, South Drive, turn right into the main entrance on the National Institutes of Health.
- Go approximately .2 of a mile just past Center Drive
- The NIH Computer Center (building 12A) is on the left, behind building 50.

Wisconsin Avenue (from D.C.)

- Proceed north from the District (past the north end of Bethesda Business District) to South Drive. This is the main entrance to the National Institutes of Health.
- Turn left and go approximately .2 of a mile just past Center Drive
- The NIH Computer Center (building 12A) is on the left, behind building 50.

NIH visitor parking is extremely limited. We strongly encourage the use of carpools and public transportation. The NIH Police strictly enforces all parking regulations.

By bus:

- Metrobuses and Montgomery County RideOn buses make stops at the Medical Center Metro stop. Call Metro information for time schedules and routes (202) 637-7000.
- The NIH Shuttle service provides regularly scheduled transportation around the main campus and between the campus and other area NIH locations.
  http://des.od.nih.gov/eweb/NIHShuttle/scripts/shuttle_map_live.asp

1.3 TELEPHONE NUMBERS

This section contains a telephone directory to key services. Keep the following information in mind:

- Users without a network connection can access Titan and the Silicon Graphics (helix) component of the Helix Systems via FTS2001 using a dialup connection. See Section 6.1.
- Long distance users, whose data phones are not on the FTS2001 system, can access the interactive services through 800 numbers.
- Ten-digit dialing is required for all NIH/HHS phone numbers in the Rockville/Bethesda area. This also affects dialup access to the NIH Computer Center's systems (e.g., 301-594-xxxx).
- The area code for the NIH Computer Center is 301.

1.3.1 Computer Services

Note: The Area Code is 301. All Telephone numbers are accessible through FTS.

Figure 1-5. Computer Services

SERVICE	OFFICE	BLDG./RM	TELEPHONE*
ENTERPRISE SYSTEMS (Titan, EOS, and Windows Server Services)			
Database Support	Database Systems Branch	12/2200	301-496-9158
IMS Support	Database Systems Branch	12/2200	301-496-6244
Help Desk	TASC	Fernwood/300	301-594-6248
New Applications	Application Services Branch	12A/4011	301-496-5524
Operating Schedule – Titan and EOS	TASC	Fernwood/300	301-594-6248
Security Investigations and Assistance	TASC	Fernwood/300	301-594-6248
Fax Number	--	--	301-496-6905
Security Policy	DCSS Security Coordinator	12A/4033	301-496-1053
Tape Library	Systems Operations Mgmt. Branch	12/1100	301-496-6021
SCIENTIFIC SYSTEMS (Helix and Advanced Laboratory Workstation)			
Help Desk - ALW**	TASC	Fernwood/300	301-594-6248
Help Desk - Helix	TASC	Fernwood/300	301-594-6248
Operating Schedule – Helix	TASC	Fernwood/300	301-594-6248
Operator - Helix	--	12/2200	301-496-6755
CONNECTIVITY SERVICES (E-mail, Networks, File Transfer, Access to Enterprise and Scientific Systems)			
Help Desk	TASC	Fernwood/300	301-594-6248
GENERAL SERVICES			
Accounts/Billing, Registration	TASC	Fernwood/300	301-594-6248
ADB Support	TASC	Fernwood/300	301-594-6248
Application Programming	Division of Enterprise and Custom Applications	Fernwood/300.	301-594-6248
Computer Center General Policy	Director, Division of Computer System Services	12A/4039	301-496-5381
Computer Center Security Policy	DCSS Security Coordinator	12A/4033	301-496-1053
Disaster Recovery Process	Disaster Recovery Coordinator	12A/4033	301-496-1053
Documentation/Publications	TASC	Fernwood/300	301-594-6248
Output Distribution and Foreign Tape Handling			
NIH Campus	Output Distribution	12A/1000	301-496-6183
Parklawn Building	Output Distribution	2B70	301-443-4253
Public Information on CIT	Office of Planning, Evaluation, and Communications, CIT	12A/4063	301-496-6203
Foreign/special Tape Handling	Output Distribution	12A/1000	301-496-6183
Statistical Packages	TASC	Fernwood/300	301-496-6248
TDD Line for Hearing Impaired	TASC	Fernwood/300	301-496-8294
Telecommunications Problems	TASC	Fernwood/300	301-594-6248
Training	TASC	Fernwood/300	301-594-6248

* Ten-digit dialing is required for all NIH/HHS phone numbers in the Rockville/Bethesda area.

. **Services available to NIH employees only.

Web access to CIT through http://cit.nih.gov

1.3.2 Online Telephone and E-Mail Directories

There are several online directories available.

NIH Enterprise Directory (NED)

The NIH Enterprise Directory (NED) is a centrally-coordinated, electronic directory, developed by CIT, to maintain accurate, current information for all NIH workers and people using NIH services or facilities. Go to:

http://ned.nih.gov

The public information on a person in the NED includes—telephone, pager, and fax numbers; e-mail address; building, room; mail stop, postal address, delivery address, and Web address. The NED also stores a person's title, IC, organizational unit, and organizational status (Civil Service or Public Health Service employee, fellow, contractor, guest, volunteer, summer employee, or tenant). Individuals are identified in the NED via their NIH ID—the 10-digit number at the bottom of their ID badge. As more and more NIH systems use the NIH ID for identification, it is important that all records in the NED be accurate and current.

Information from the NED is linked to the customer information available through Web Sponsor (see Section 2.3).

Updating Entries

If you are an NIH federal employee, you can update most of your own customer information using NED.

If you are a contractor/fellow/Commissioned Corps officer/guest/volunteer and your record is incorrect, an administrative officer (AO) in your Institute or Center can update your entry.

Customer Locator

The CIT Customer Locator provides account and directory information for anyone with a Titan USERid, through the Web. Users can learn the names of the account sponsor and alternate sponsors for a Titan account. This facility displays directory information by user name or by the Titan USERid. Customer Locator also has links to the NIH Enterprise Directory (NED) and the HHS Employee Directory. Visit:

http://titan.nih.gov/locator

HHS Directory

The Department of Health and Human Services organizational directory is available on the Web. You can search the directory by employee name or look for information for a particular office. Employees can correct their directory information using an online form. Go to:

http://directory.psc.gov

NIH Directory and E-mail Forwarding Service
The NIH Directory and E-mail Forwarding Service can be accessed from any Internet-connected computer. NIH staff can use the Web-based change form to keep entries up-to-date. You can access this directory through the Web at:

http://directory.nih.gov

1.4 OPERATING HOURS

Although the mainframe component of the NIH Computer Center operates on a seven-day 24-hour basis, the availability of individual services varies. The operating hours for all the enterprise systems (Titan, EOS, and Windows Server Services) can be found on the Web at:

http://silk.nih.gov/public/public.schedule

Figure 1-6. Operating Hours

System Service and Day	Hours
Titan Service	
TSO, WYLBUR, CICS ADABAS, Model 204, Batch	24 hours, 7 days a week*
IMS (restricted availability)	
Monday-Friday	8:30 a.m. - 6:00 p.m.
Saturday	7:00 a.m. - 3:00 p.m.
DB2 Subsystems	Generally available 24 hours, 7 days a week**
Output Distribution Services	
Monday-Friday	24 hours
Weekends	As workload dictates
Information Media Library	
Monday-Friday	7:30 a.m. - 5:00 p.m.
Other CIT Services	
TASC - Consulting Desk	
Monday-Friday telephone support	7:00 a.m. - 6:00 p.m.
EMERGENCY after-hours telephone support	6:00 p.m. - 7:00 a.m.
CIT Training Program	
Monday-Friday	8:00 a.m. – 5:00 p.m.
Other Offices	
Monday-Friday	8:30 a.m. - 5:00 p.m.

* Unattended service Thanksgiving, Christmas, and New Year's Day.
** See http://silk.nih.gov/SILK/DB2UG/AVAIL for details.

Special arrangements for service beyond the announced schedule may be possible if needed; contact the head of Computer Operations through the TASC help desk.

Unattended Service on Titan
Unattended service allows the use of some Titan services during periods of time (such as holidays) when these services would otherwise be unavailable. Go to:

http://silk.nih.gov/public/public.schedule

for information about specific holidays when unattended service will be in effect and the limitations on unattended service.

Unattended service currently consists of WYLBUR, TSO, ADABAS, DB2, and Model 204 availability. Users can do most of their regular tasks using those software applications during the unattended service period. All batch processing services that do not require foreign tape access are available. During unattended service:

- No jobs are printed on the central printers.
- No foreign tapes are mounted (NIH tapes can be mounted).
- Some migrated data sets and data set backups are not accessible (e.g., some NBARS data sets).
- Normal OUTPUT HOLD time limits are enforced.

1.5 PROPER USE OF THE NIH COMPUTER CENTER

All users of the CIT enterprise systems are expected to abide by all laws and regulations regarding the proper use of government information technology resources. Users are expected to comply with the following when using the CIT systems:

- The enterprise systems are to be used for official government business only. Users must not use the systems for personal gain, outside business activities, political activity, fund raising, charitable activity not sponsored by a government agency, or for playing games (even in learning situations).
- Users must not use CIT systems to produce, store, display, or transmit material that is offensive to others including sexually explicit or suggestive materials.
- Users must not use the CIT systems to produce, store, display, or transmit material that constitutes harassment of other individuals on any basis including race, ethnicity, or sexual orientation.
- Users must not use the CIT systems as a staging area for gaining unauthorized access to any other information systems or for, in any way, damaging, altering, or disrupting the operations of the other systems.
- Users must not use the CIT systems and services for capturing or otherwise obtaining passwords, encryption keys, or any other access control mechanism that could permit unauthorized access to any computer system.
- Access to information on the CIT systems is the sole responsibility of the "owner"—the account sponsor or registered user—of the information. Users must not access that information without the explicit permission of the owner, regardless of the degree of

access control applied. The only exception is users may freely access information that is stored under a facility for general availability such as the Web or public libraries.

- Users are expected to use the services and facilities provided by the CIT systems in accordance with the standards set forth in the appropriate guides. If a facility is not described in any guide, contact the TASC help desk for assistance before attempting to use it.
- Users must not use electronic communications such as electronic mail to harass others, send obscene messages, forward chain letters or hoaxes, or send mass mailings indiscriminately.

Users who violate these rules of behavior are subject to disciplinary action in accordance with the NIH Information Technology General Rules of Behavior.

Authorities:

- Public Law 93-579, U.S. Code 532(a), the Privacy Act (1974)
- Public Law 99-474, 18 U.S. Code 1030, the Computer Fraud and Abuse Act (1986)
- Standards of Ethical Conduct for Employees of the Executive Branch, 5 C.F.R. Part 2635
- HHS Standards of Conduct, 45 C.F.R. Part 73, Subpart M
- NIH Information Technology General Rules of Behavior at:

  http://irm.cit.nih.gov/security/nihitrob.html

Software distributed by the NIH Computer Center, CIT, is obtained under a variety of legally binding license agreements that restrict the use, duplication, and transfer of the software and associated documentation. Unauthorized use, duplication, and/or distribution of this software can result in penalties for both the individual responsible and the National Institutes of Health, including civil damages up to $50,000 for each occurrence and criminal penalties including fines and imprisonment.

Each software package and associated documentation distributed by the Computer Center is authorized for limited use in conjunction with the services provided by the NIH Computer Center. This software and documentation may not be duplicated or transferred to any other individual or facility. Each user who requests and receives software distributed by the NIH Computer Center is responsible for insuring its proper use. In the event of improper use, unauthorized copying, or redistribution of the software and/or associated documentation, the NIH Computer Center will contact the responsible user and account sponsor for corrective action. If questions arise about software distributed by the NIH Computer Center, please contact the TASC help desk.

1.6 CONTRACTING GUIDELINES

When an organization is preparing or administering a contract for an application to be used at the NIH Computer Center, the staff should pay particular attention to the following sections of the *Titan User's Guide*:

1	ORIENTATION
2	REGISTRATION AND DEREGISTRATION
4	SECURITY AND DISASTER RECOVERY
5.1	SOFTWARE SUPPORT
5.2.5	Assistance for Implementing Non-NIH Software
7.1.1.2	Software Features Not Permitted at NIH
9	BATCH JOB SERVICES

In addition, the contracting office and account sponsor should be familiar with the *Titan User's Guide*.

The *Titan User's Guide* defines the Computer Center's current software standards; however, these change with the passage of time, in response to the needs of our users and developments in computer technology. Because of this, it is a good idea to discuss the proposed software with the Application Services Branch (ASB) before the contract is finalized. ASB will be able to provide some guidance concerning hardware and software changes which may occur in the relatively near future. ASB is also familiar with many

alternatives that may be used in place of standard IBM facilities and other software whose use is not permitted at NIH.

1.7 ACCESS FOR PERSONS WITH DISABILITIES

It is important that all of our users have full access to Computer Center services and facilities. The Americans with Disabilities Act of 1992 was passed to ensure that persons with disabilities have equal opportunities and guarantees of civil rights. "Reasonable" accommodation, access to facilities and alternate forms of media and communication are inherent in the implementation of the Act. CIT is in compliance with Section 508 of the Rehabilitation Act, amended in 1998, concerning the accessibility of electronic and information technology (including Web pages) for persons with disabilities. For information about Section 508, go to:

http://508.nih.gov

The NIH Computer Center and the associated offices of CIT, such as the Technical Assistance and Support Center (TASC) help desk and the CIT Computer Training Program, are located in wheelchair-accessible buildings. Individuals who are hearing or speech-impaired can contact any person or office within the Center for Information Technology via a TDD (Telecommunications Device for the Deaf) located in the office of the Computer Training Program. The TDD is answered during the office's regular hours. See Section 1.4.

All users, including individuals with disabilities, are welcome to attend any course in the CIT Computer Training Program for which they meet the technical and administrative prerequisites. There is elevator service to the classroom level; both the classrooms and the restrooms, on the same floor, are wheelchair accessible. If any special services, such as a sign language interpreter, recorded notes, or specialized terminal will be needed, the prospective student should contact the CIT Computer Training Program staff at least two weeks prior to the beginning of the class to make the necessary arrangements. Because elevators cannot be used in case of fire, students who may need assistance negotiating the stairs should inform the CIT Computer Training Program staff well before the first day of the class.

Users with special needs who would like to make suggestions concerning the accessibility of the NIH Computer Center and its related CIT services should contact the TASC help desk or submit a CIT Service Request (see Section 5.2.2).

For more information on IT accessibility resources and other accessibility resources, go to:

http://irm.cit.nih.gov/policy/access.html

2 REGISTRATION AND DEREGISTRATION

This section describes how to register users for the services offered by the Titan system and how to deregister users. Contact the CIT TASC help desk if you have questions concerning the registration and deregistration. See Section 1.3.1 for the phone number.

2.1 ACCOUNT OFFICIALS

When an organization uses Titan services, CIT assigns certain responsibilities relating to registration, deregistration, billing, and security to persons within the customer organization. CIT refers to these account officials as:

- account sponsors (see Section 2.2.1)
- deregistration officials (see Section 2.4.1)
- billing coordinators (see Section 3.2.1)
- security coordinators (see Section 4.6)

All account officials should be familiar with the Web Sponsor facility for displaying and changing account and customer information. (See Section 2.3.) For each Titan account official role, there is one primary and any number of alternates. A person within an organization can hold several positions. For example, the account sponsor can also be the security coordinator, the billing coordinator and the deregistration official. All Titan account sponsors and deregistration officials must be government employees.

The IC (institute/center) Executive Officer or responsible agency official assigns a deregistration official for an account. The deregistration official, in turn; can change the primary account sponsor. In addition to the deregistration official, the primary account sponsor can assign and remove alternate account sponsors, and reassign the primary account sponsor. Any account sponsor can assign, reassign, or remove security coordinators and billing coordinators.

The Account Sponsor Interest Group (ASIG) provides an informal forum for discussion of issues important to account sponsors, deregistration officials, and other account officials (e.g., billing coordinators, security coordinators). For more information, subscribe to the ASIG-L listserv list. Go to:

http://list.nih.gov

to learn how to subscribe.

Figure 2-1. Account Official Assignments

Official	Assignments	Method
IC Executive Officer or responsible agency official from a non-NIH organization	Assigns the initial account sponsor and alternate Assigns/reassigns deregistration official and alternate for an account	CIT Deregistration Official Authorization form (see Section 2.2.4.4)
Deregistration official	Reassigns primary account sponsor	Web Sponsor (see Section 2.3)
Primary account sponsor only	Assigns and removes alternate sponsors Reassigns primary sponsor	Web Sponsor
Any account sponsor	Assigns/reassigns, removes • security coordinators • billing coordinators	Web Sponsor

2.2 REGISTRATION FOR SERVICES

You must be a registered user to take advantage of the services provided by Titan. If you were registered for the previous CIT North System or South System, you are automatically registered to use Titan. Registration certifies that the user has an operating program requirement and funds with which to reimburse CIT for services received.

New users are welcome at the NIH Computer Center. If you are interested in becoming a user but have questions about the NIH Computer Center, the TASC help desk consultants will be glad to refer you to an appropriate staff member.

If There Is An Existing Account

If an account already exists for your organization, the account sponsor for the organization can simply add new users to that account through Web Sponsor. (See Section 2.3.) The account sponsor authorizes the use of resources and services at CIT and can add users to the account.

If This Is A New Account

To initiate a new account, a person with authority to obligate funds must complete an Account Authorization form for the organization. If the sponsoring organization is outside of NIH, an Interagency Agreement must also be submitted. See Section 2.2.4 for more information about the forms. For registration information for CIT systems and services, as well as downloadable forms, go to:

http://support.cit.nih.gov/accounts

The forms must be faxed or sent to CIT. After receiving the appropriate forms, CIT will establish an account code for the user organization. Account codes are unique codes used to identify the recipient of services. Once the account is set up, the account sponsor can register additional users for the organization through Web Sponsor. Visit:

http://websponsor.cit.nih.gov

Once A New User Is Registered
After completing the registration process, the account sponsor receives a unique USERid and a temporary password to give to the new user. The user should immediately change the password to ensure further security. Account sponsors and security coordinators can reset the passwords for users under their account through Web Sponsor (see Section 2.3). Users can change their passwords through Web RACF (see Section 4.7.4).

All Titan users have a default output box number value assigned when they are registered, but users can set or change their output box numbers. For information on output boxes, see Section 5.6.1.

Account sponsors must maintain close surveillance of user registration data for their organizations. Current information (e.g., telephone number, address) on each user must be available to fulfill security requirements and to permit CIT to contact users directly. Account sponsors monitor the account through Web Sponsor. For more information on Web Sponsor, see Section 2.3. For additional information, call the TASC help desk or send e-mail to TASC@nih.gov.

2.2.1 Responsibilities of Account Sponsors

Each user organization must appoint an account sponsor as the primary point of contact between the users and the NIH Computer Center. The name of the account sponsor must be specified in the CIT Account Request form. To learn the name of the account sponsor for an agency, contact the TASC help desk. To find the name of an account sponsor for a specific account, use the Customer Locator (see Section 1.3.2.)

Account sponsors and their designated alternates play a vital role in the success of the computer applications that are run at the NIH Computer Center. Because of this, each sponsor should designate at least one alternate to accept responsibility in the sponsor's absence. Sponsors and alternates must be government employees. They have full responsibility for their computer accounts. Account sponsors must ensure that all computer applications directly relate to the official government business defined in the request for use of the NIH Computer Center, and that all work adheres to the Center's published standards and procedures. They can reset passwords and have all of the other security authorities of the security coordinator (see Section 4.6). Account sponsors can refer to the manual *Procedures for Deregistration Officials and Account Sponsors*, available through the CIT publication ordering service (see Section 5.4.1).

Account sponsors use Web Sponsor to perform account and USERid changes interactively. For more information on Web Sponsor and the functions that account sponsors can perform, see Section 2.3.

The account sponsor and the alternate should have some understanding of NIH Computer Center operations. Sponsors are urged to take advantage of the wide variety of services described in this manual. There are extensive self-study and classroom training opportunities offered by the CIT Computer Training Program (described in Section 5.3). CIT provides documentation via the CIT publication service (see Section 5.4).

The specific responsibilities include the following:

- are responsible for the appropriate use of an account
- add/remove customers for an account
- reassign USERids within the account
- authorize/remove/transfer customers for CIT services (e.g., Helix, ALW, remote access, etc.)
- close accounts
- change the account title or CAN number
- keep user information current
- have all of the security authorities of the security coordinator
- access billing data
- add, change, or remove primary and alternate security and billing coordinators
- perform data functions (when removing USERids from account)
- deregister users from DB2
- can delete user datasets (DASD, tape)
- primary sponsor only:
    - adds, changes, or removes alternative sponsors
    - designates a new primary sponsor

CIT wants to know of any problems encountered by account sponsors and would like to hear about their concerns. Submit a CIT Service Request to communicate user problems, and to apply for refunds. See Section 5.2.2 for further information. Occasionally CIT will have to contact an account sponsor in order to update information or to discuss a problem concerning the use of an account.

The CIT Technical Assistance and Support Center (TASC) help desk serves as the central point of contact for all CIT accounts and welcomes inquiries from sponsors concerning administrative procedures.

2.2.2 Accounts

Accounts identify the customer organizational unit responsible for reimbursing CIT for the charges that will be incurred. Accounts will not change from those used on the previous CIT North and South Systems. All former agency codes/accounts exist on Titan. All accounts on Titan are defined as RACF groups and the USERids and RACFids assigned to an account are members of that RACF group. (See Section 4.7 for information on RACF.)

2.2.3 USERids

USERids are required for accessing system services such as batch jobs, interactive and database systems, and RACF. A USERid identifies a particular registered user of a system. On Titan, the USERid, TSOid, and RACFid are identical. The USERid:

- validates individuals signing on to the system (like the TSOid)
- acts as the high-level qualifier for user-owned data sets
- identifies users who are permitted access to data (like the RACFid)
- must be associated with an output box number (NONE is a valid value for a box); see Section 5.6.1 for more information.
- **should not be shared**. All users must have their own USERid.

If a user causes systems problems and cannot be located by CIT staff, the USERid will be deactivated until the staff can contact the user.

Characteristics of Titan USERids

- Titan USERids may be from 2 to 8[1] characters long, with the first character an alphabetic letter or a $. TSOids are limited to 7 characters in length. USERids of 8 characters cannot log on to TSO.
- Each USERid is associated with one, and only one, account.
- The USERid, TSOid[2], and RACFid are identical.
- User-owned data sets must begin with either the USERid—with the form *userid*.name (e.g., johndoe.dataname)—or with the account (e.g., *aaaa*.dataname or *aaa*.dataname). For information on data set naming conventions, see Section 10.

[1] While the migration progresses, all USERids will be restricted to the North ($iii) and South (aaaaiii) formats. When both North and South Systems have migrated, there will be additional options for USERids.

[2] TSOids are limited to 7 characters in length. USERids of 8 characters cannot logon to TSO.

Figure 2-2. Format for Titan Identifications

Titan Identification	Format
USERid	From 2 to 8 alphanumeric characters
account	3 or 4 alphanumeric characters (e.g., aaa or aaaa)
RACFid	Same as USERid
TSOid	Same as USERid
RACF group	Same as account
dsname	userid.dataname or account.dataname

CIT will establish a policy to eliminate inactive Titan USERids. The criteria will be defined in future editions of the *Titan User's Guide*.

2.2.3.1 USERids with Non-expiring Passwords

In some cases, it may be necessary to have USERids associated with passwords that do not expire. The most common examples are for batch jobs that are submitted automatically with embedded passwords, or for Web or database access from a middle tier application that connects via a predetermined USERid and password. An account sponsor can add a new customer (USERid) through Web Sponsor and specify, "Never expire" for the password. However, that USERid will not be allowed to sign on to the interactive TSO facility. USERids with non-expiring passwords should be used only when necessary.

These USERids have the following characteristics:

- Batch, Web, and database access is permitted.
- They can be used to create data sets.
- Their associated passwords do not automatically expire after 180 days.
- They cannot be used to log on to TSO.

> **Note:** Former South System project initials and storage initials automatically became USERids with non-expiring passwords on Titan. The passwords for these initials were not set on Titan. The account sponsor can contact the TASC help desk for assistance with setting a password on Titan.

2.2.3.2 Inactive USERids

CIT deletes inactive USERids on an annual basis in order to reduce the risk of unauthorized access to NIH data. The date of the cleanup is announced in *Titan News*.

A USERid is considered inactive only if **ALL** of the following conditions exist:

- It has not been used to sign on to TSO (including Model 204 or ADABAS), WYLBUR, or IMS (including the ADB and the Data Warehouse) for two years.
- It has not been used to run a batch job for two years
- It has not been used to access a secure SILK Web site (which prompts for the USERid and RACF password).
- It does not have any tapes assigned to it.
- It does not have any active data sets or DB2 objects on public disks assigned to it (except for system-generated data sets such as those automatically created for WYLBUR mail (for former South System users), DB2 and ISPF).
- It does not have any migrated data sets assigned to it (except for system-generated data sets, as above).
- It is not registered for Helix, ALW, or Parachute.

If you have any questions about the policy or the process, contact the TASC help desk.

2.2.4 Account Authorization Forms

To set up a CIT Titan account, go to:

http://support.cit.nih.gov/accounts

Click on Forms, and then select the appropriate form. There is one form for NIH customers (see Section 2.2.4.1) and a separate form for non-NIH customers that is an interagency agreement (see Section 2.2.4.2). This site also includes registration information for other CIT services such as Helix System, ALW, Parachute, and the Central Email Service.

2.2.4.1 CIT Account Request – Titan System (for NIH Customers)

Anyone within NIH who wishes to open a CIT account that includes Titan access must fax or mail the NIH customer form to the TASC help desk. Although anyone can request an account, the authorizing official who signs the form must have the appropriate authority within the Institute or Center (IC). The requestor should be able to answer questions that CIT may have about the information on the form. To authorize additional users on an account, account sponsors must use Web Sponsor (see Section 2.3).

2.2.4.2 CIT Account Request – Titan System (for Non-NIH Customers)

Government organizations outside the National Institutes of Health may obtain CIT services, including access to Titan, through an interagency agreement. Organizations should fax or mail the non-NIH customer form to CIT. Although anyone can request an account, the authorizing official who signs the form must have the appropriate authority within the government agency. The requestor should be able to answer questions that CIT may have

about the information on the form. To authorize additional users on an account, account sponsors must use Web Sponsor (see Section 2.3).

2.2.4.3 Non-NIH Users' Annual Renewal Form

Near the end of the fiscal year, CIT sends out a CIT Annual Renewal of Interagency Agreement form to each non-NIH organization using its services. This form must be completed and then faxed or mailed to the TASC help desk.

2.2.4.4 Deregistration Official Authorization Form

The Executive Officer (for NIH customers) or responsible agency official (for non-NIH users from HHS and other federal government agencies) must sign the Deregistration Official Authorization form to assign or change the deregistration official or alternate deregistration official for CIT accounts.

2.3 WEB SPONSOR

Account sponsors, security coordinators, billing coordinators, and deregistration officials can use a Web-based facility—Web Sponsor—to display information and perform many account and security-related functions for the accounts and USERids under their control. Web Sponsor includes functions[3] such as:

- downloading account forms
- registering users
- resetting passwords for users on the account

  Note: Users with an NIH ID badge number can request a reset of their Parachute, VPN, Helix, or ALW passwords directly, rather than going through their sponsors. The requestor is validated for the specified userid based on their NIH Login User name and domain. Go to:

  http://silk.nih.gov/passwordset
- reset passwords that were restricted under the former South System to access only certain CIT services. To allow these USERids to access TSO, select the Change Password Expiration link and choose "Expire after 180 days."
- revoking, restoring, or reassigning USERids
- specifying a default level of data set access for new users on the account
- updating addresses, output box numbers, and telephone numbers for users on their accounts—for users who are affiliated with NIH; this can be done through the Web Sponsor connection to the NIH Enterprise Directory (NED). (See Section 1.3.2.)
  Note: changes made directly through Web Sponsor will not be propagated to the NED.
- closing accounts

[3] Until the transition period ends, sponsors with "South-style" USERids and sponsors with "North-style" USERids will have slightly different functions available to them on the Web.

- deleting user data sets
- registering and removing registration for Model 204
- granting authorization for ADABAS
- displaying an account log and a customer log. Web Sponsor displays the number of datasets, number of tapes, and the Model 204 ID (if there is one) for each USERid valid for the account, or for the specified USERid.
- displaying a resource matrix for a customer
- authorizing/removing/transferring customers for Helix and ALW
- processing requests for remote access (e.g., Parachute, VPN)
- deregistering users from DB2
- changing/adding/removing primary and alternate account officials
- viewing billing reports
- registering for the NIH Data Warehouse

Most actions through Web Sponsor are effective immediately.

To use Web Sponsor, go to:

http://websponsor.cit.nih.gov

RACF security protects all Titan system data from unauthorized access. The first time the Web Sponsor page is accessed from a Web browser, a security "pop-up" window prompts for a USERid and password. Only account sponsors with valid USERids and passwords will be allowed to display and change data for their account.

Web Sponsor access via NIH Login
Account officials associated with NIH can access Web Sponsor via the NIH Login. They are prompted for their NIH Login User name and password rather than their Titan USERid and password. Go to:

http://websponsor.cit.nih.gov/nihlogin

Authentication via NIH Login will fail if your NIH ID has not been added to your Web Sponsor customer record. To remedy this, log in to Web Sponsor, click on Change Customer Information under "Customers." On the next page, specify your userid or name. Complete your customer record and click "Submit Request." Once your customer record has been updated, you can access Web Sponsor via NIH Login.

For More Information
For detailed information on Web Sponsor features and validation via the NIH Login, go to:

http://silk.nih.gov/silk/sponsorinfo

2.4 DEREGISTRATION FROM SERVICES

Deregistration officials are responsible for ensuring that users who are no longer authorized to incur charges have their access/authorities removed from NIH systems. Deregistration officials and alternates are appointed by the NIH IC (Institute, Center) Executive Officer or by the responsible agency official (for non-NIH accounts).

2.4.1 Responsibilities of Deregistration Officials

The deregistration official has ultimate responsibility for ensuring that access to CIT computing services, including financial systems (e.g., databases on the mainframe system), is denied when an employee resigns or is transferred to another IC or government agency. Since deregistration officials are responsible for some issues regarding funds, security, and privacy with respect to the NIH Computer Center, they must always be government employees. There should be an alternate deregistration official who can carry out these functions if the primary is not available.

The deregistration official has the following responsibilities:

- oversees the deregistration of users from their account(s)
- resets RACF passwords when users leave the IC or agency
- **primary deregistration official only:**
  - adds, changes, or removes account sponsors, including selecting a new primary account sponsor
    (Note: when a new account is opened, the name of the account sponsor must be specified on the CIT Account Request form)

Deregistration officials use Web Sponsor to carry out many of their functions. See Section 2.3.

For more information, refer to the manual *Procedures for Deregistration Officials and Account Sponsors*, available from the CIT publication ordering service (see Section 5.4.1).

2.4.2 Terminating Use of Services

Account sponsors use Web Sponsor to help close an account or to remove a user from an account.

Closing an account or removing a user from an account can only take place after all of the requirements listed below have been met.

- The account sponsor ensures that all computing resource usage has ceased.
- The USERid no longer owns data sets or tapes.
  - Data sets and tapes that contain important or useful data should be transferred to another USERid.

- All unneeded data sets should be scratched, and unneeded tapes released.

The specific steps required to perform this reassignment/release of data and resources are listed below. Many of these steps can be accomplished through Web Sponsor, as indicated.

- Rename all data sets that are still of active use to the organization. Reassign them to valid USERids and accounts (Web Sponsor).
- Cancel subscriptions to Internet listserv lists.
- If the person leaving has acted as the contact point for dedicated hardware, the name of the new contact must be sent to the TASC help desk.
- Remove the USERid when the cleanup is complete (Web Sponsor).

  An alternative to canceling USERids as described above is to reassign the USERids to another user in the office. In this way, the USERid is placed under the control of another employee without having to reassign or release any data sets and tapes. When using this approach, the account sponsor should ensure that the resources used by the reassigned USERids are closely monitored. Contact the TASC help desk if there are any questions concerning the reassignment of USERids or the deregistration procedure.
- If an account is to be closed, first remove each USERid in the account. Then, use Web Sponsor to close the account once the cleanup is complete.

3 CHARGING

A schedule of rates governing the various kinds of services offered by CIT has been established under the NIH Service and Supply Fund (Revolving Fund). The schedule of rates for the various services offered by Titan is available in Section 3.1. For billing purposes, every request for service identifies the user by the Titan USERid described in Section 2.2.3. This code must be used on all requests for services. CIT billing practices are described in Section 3.2. For refund information, see Section 3.2.2.

Leased services (i.e., leased communication lines) must be allocated by CIT. The account sponsor must submit a written request to CIT in order to allocate or discontinue the use of these services. CIT charges user organizations on a pro rata basis for the leased services during the time of allocation.

Section 3.1 contains the rates as of press time for this manual. Occasionally CIT must make adjustments to the rate structure during the year.

For the most current rates for Titan and other NIH Computer Center services, go to:

http://datacenter.cit.nih.gov/rates

3.1 CHARGING FOR INDIVIDUAL SERVICES

The rates for the current fiscal year are shown in Figure 3-1. **Note:** CPU seconds refer to an IBM Generation5 (9672G5) processor.

Figure 3-1 Titan Charges

Service	Rate
Processing *	
Batch CPU (per CPU second) **	$ 1.80
Batch I/O (SIO) (per 1,000)	$ .02
Interactive CPU (per CPU second) **	$ 2.08
Interactive I/O (SIO) (per 1,000)	$ .02

* TSO, Model 204, and ADABAS CPU and I/O charges are computed at either the batch or interactive rate, as appropriate. IMS CPU charges are computed at the interactive rate.

** A shift discount of 50% applies to both batch and interactive processing (per CPU second).
Prime shift is 7:00 A.M. to 5:00 P.M., Monday through Friday. Discount period is all other times.

Service	Rate
DB2	
Up to to 2.273 CPU seconds (per CPU second)	$ 1.32
>2.273 to 5.682 CPU seconds (per CPU second)	$ .968
>5.682 to 45.455 CPU seconds (per CPU second)	$ .44
Over 45.455 CPU seconds (per CPU second)	$ .22
IMS (per ENTER keystroke)	$ .05
Disk	
Disk storage (per MB-day)(level 0)***	$ .01
Disk storage (per MB-day) (levels 1 & 2)	$ .01
Backup (per MB-day)	$ .0002
Dedicated disk (per month)	$ 2,050.00
*** Level 0 storage rate for former North system users is gradually being reduced from the North $.045 rate. The rate dropped to $.02 on October 1, 2003 and will drop to $.01 in 2004. See the article in the July 18, 2002, *Titan News* (http://datacenter.cit.nih.gov/titannews).	
Tape	
Tape mount	$ .50
Library storage (per tape-day)	$ .035
Printing	
Standard (per image)	$ .06
Impact (e.g., labels) (per 1,000 lines)	$ 1.15
Remote Job Entry	
Setup charge for new RJE	$ 100.00
Dedicated line (per month)	cost pass-through
Port charge (per month)	$ 50.00
MISCELLANEOUS SERVICES	
Firewall Services for Application	
Hardware and system support (per month)	$ 450.00
Firewall ruleset support (per month)	$ 1,985.00
NBARS (TSM Software)	
Storage (per file, per month)	$ .00075
Data transfer (per node, per month)	
first gigabye	$ 15.00
each gigabyte thereafter	$ 7.50
minimum data transfer charge (no activity)	$ 3.00

Service	Rate
Central Printing (Network Initiated) Per image	$ .06
Disaster Recovery	
Standard (per application, per month)	$ 625.00
Google Search on Web Sites	
Setup (one-time charge)	$ 200.00
Maintenance (per month)	$ 100.00
SILK Web (Per Customized Server, Per Month) Basic (up to 10MB storage, 500MB data transfer)	
Server charge Password protection	$ 60.00 $ 10.00
Secure sockets layer (SSL)	$ 20.00
Intermediate (up to 25MB storage, 1000MB data transfer)	
Server charge	$ 110.00
Password protection	$ 15.00
Secure sockets layer (SSL)	$ 35.00
Advanced (up to 50MB storage, 2000MB data transfer)	
Server charge	$ 200.00
Password protection	$ 20.00
Secure sockets layer (SSL) **SILK Web (Public and Secure Servers)** Unlimited number of Web pages ("@WWW" data sets) stored under a Titan USERid (per month) plus normal data set charges	$ 50.00 $ 20.00

3.1.1 Discount Processing

Discount service offers a 50% discount to interactive and batch processing between the hours of 5:00 p.m. and 7:00 a.m. Monday through Friday and all day on weekends. Federal holidays are treated the same as weekdays. There is no discount for tape mounting or central printing. To request batch processing during the discount period, add the following control statement:

```
/*DISCOUNT
```

after the JOB statement. Even if a job does not include a `/*DISCOUNT` statement, any job that begins execution during the discount period will receive the discount rate.

For more information on job control language, refer to the *Titan Batch Processing* manual. See Section 5.4 for ordering information.

3.2 BILLING

Titan uses the CIMS billing system to prepare monthly invoices, by account. CIMS enables budget and administrative officers to track CIT charges. The invoice shows charges for the previous billing period as well as the total charges for the fiscal year for Titan-based services and other miscellaneous services. A billing period covers actions from the 22nd day of the previous month to the 21st day of the current month.

Account officials and users review charges in the following ways:

- Account sponsors and billing coordinators can use the CIT Billing Reports link in Web Sponsor to view CIT charges for their account and for the individual users under their account. See Section 2.3 for information on Web Sponsor.
- Account sponsors, billing coordinators, and Data Warehouse Budget & Finance registered users can use the CIT Billing – Queries & Reports facility, available through the NIH Data Warehouse. Go to:

  http://datatown.cit.nih.gov

  and select CIT Billing Reports under Useful Links.

- Users can look at their batch job output for the estimated cost for each job step. A sample of job output is included in the manual *Titan Batch Processing*.

3.2.1 Billing Coordinators

Each organization using the Titan system must have a billing coordinator, (usually a financial officer) assigned by the account sponsor. The billing coordinator deals with the financial aspects of an account. This official may be a contractor.

There must be one primary billing coordinator and any number of alternates. The billing coordinator:

- receives invoices (primary billing coordinator only) for appropriate accounts
- accesses billing data

3.2.2 Refund Policy

If you think that you have been overcharged for Titan services, you can apply for a refund and CIT will investigate your charges. CIT will give refunds for jobs that fail due to the following reasons:

- hardware failure
- failure due to NIH Computer Center-supported software
- operational errors

There are no refunds for:

- jobs aborting due to user's application program failure
- I/O errors caused by defective foreign tapes
- errors occurring or jobs aborting as a result of the user violating instructions or restrictions as stated in the *Titan User's Guide* and *Titan Batch Processing*

  This also includes errors occurring or jobs aborting as a result of exceeding job limits or failing to follow vendor reference manuals and warnings.

Obtaining Refunds

To request a refund for a run that has aborted due to an error/problem with NIH Computer Center services, the user should:

- Contact the TASC help desk by phone or submit a CIT Service Request (see Section 5.2.2).
- Submit all supporting documentation (i.e., source listing, dumps, and terminal listings) to the TASC help desk.
- Preserve, unchanged, all the evidence related to the problem.

CIT will review the request and contact the user (by telephone or e-mail) to report whether the request for a refund has been approved or denied. If a refund is not justified, the staff member will provide the user with an explanation.

If a refund is approved, the appropriate amount will be credited to the user's account and will appear as a credit on their monthly statement. Because of the processing overhead, refunds for services amounting to less than $10.00 will not be credited, however you can accumulate requests for refunds related to batch charges until they total $10.00 or more.

3.3 CONTROLLING COSTS

CIT wishes to help users make efficient and effective use of its facilities. This section includes suggestions to control information processing costs. See Section 3.2 for information on billing.

Batch Processing
In addition to the hints below, the documentation for individual programming languages and procedures often contains additional cost-saving recommendations. To reduce the costs of batch processing try the following:

- Run batch jobs overnight or during weekends to obtain dramatic savings. Refer to Section 3.1.
- Reduce the number of tape mounts required by some jobs.
- If a tape will be used more than once in a step or in multiple steps, proper JCL can minimize the number of times the tape must be mounted, and therefore, the corresponding tape mount charges. Use the JCL subparameter RETAIN in the VOLUME parameter and the PASS subparameter of the DISP parameter to ensure, where possible, that a tape remains mounted during and between steps.
- Execute a fully or partially resolved load module for programs that are run repeatedly rather than compiling the program each time. For COBOL, FORTRAN, and PL/I, compiler optimization options can provide additional savings.
- Reblock your files to reduce I/O costs. Small blocksizes increase I/O counts.

Interactive Sessions
As with batch processing, an effective way to save money is to use the system during the discount period.

Storage
- Cut costs by storing data economically. Data sets that are no longer of value should be scratched.
- Condense partitioned data sets (PDSs) using the RELEASE option with the space allocation.
- Use the NOBACKUP management class for data sets that do not require Computer Center backup.
- Examine tape usage to determine if some data should be stored on disk. The convenience, automatic backup, and low disk charges often make disk an attractive alternative to tape.

Network Services
- Use the NIH Backup and Recovery Service (NBARS) to backup only the files on your workstation that contain critical data.

4 SECURITY AND DISASTER RECOVERY

The NIH Computer Center provides a secure computing environment suitable for hosting sensitive applications and data for NIH and other government agencies.

Appendix III to OMB Circular A-130 states: "The Appendix requires the establishment of security controls in all general support systems, under the presumption that all contain some sensitive information, and focuses extra security controls on a limited number of particularly high-risk or major applications." CIT, as a provider of general support systems, manages and configures all host systems in conformance with the following laws, regulations, and policies to provide the appropriate protection controls for hosting customer data and applications that are determined to be rated high-risk or major applications:

- Public Law 93-579, U.S. Code 532(a), the Privacy Act (1974), requires the U.S. Government to safeguard personal data processed by federal agency computer systems. It also requires the government to provide ways for individuals to find out what personal information is being recorded and to correct inaccurate information.
- OMB Circular A-130, Management of Federal Information Resources (1985), establishes requirements for effective and efficient management of federal information resources. Appendix III, Security of Federal Automated Information Resources, establishes the requirements for agency security programs to safeguard the sensitive information they process.
- Public Law 100-235, the Computer Security Act (1987) requires every U.S. government agency that processes sensitive information to have a customized computer security plan for the system's management and use. It also requires that all U.S. government employees, contractors, and others who directly affect federal programs undergo ongoing periodic training in computer security.
- Federal Information Security Management Act of 2002 (FISMA), enacted as part of PL 107-347, the E-Government Act of 2002; codifies the security requirements contained in Appendix III of OMB Circular A-130. In addition, it requires agency Inspector Generals to conduct independent audits of agency information security programs, through testing security controls on a subset of agency systems, and report the results to the OMB, which in turn reports the findings to Congress.
- Department of Health and Human Services policies and guidelines.
- NIH computer security policies and guidelines published on the NIH intranet.

Significant security controls for Titan include:

- restrictions on physical access to the facility housing the CIT enterprise systems (physical security)
- policies and procedures for ensuring that only authorized individuals are granted access to Titan (user registration). See Section 2.2 for details.
- policies and procedures for authenticating users before granting access to Titan (passwords)

- procedures for ensuring tapes and printed output are appropriately protected (input and output controls)
- procedures for ensuring security violations are handled and resolved in a timely manner (security violation monitoring)
- program for ensuring the continuation of operations following an event that causes an extended disruption of enterprise systems operations (disaster recovery)
- technical controls for protecting data sets—Resource Access Control Facility (RACF)
- annual SAS 70 audits of enterprise systems processing data and applications to ensure that the security controls remain effective to protect those data and applications (Titan has SAS 70 Type II validation.)

While CIT is responsible for maintaining a secure operating environment on the enterprise systems, individual users are responsible for ensuring that their own data and applications are protected. CIT provides the necessary procedures and tools that enable users to fulfill their security responsibilities.

4.1 PHYSICAL SECURITY

For current security procedures in effect at the NIH campus, go to:

http://www.nih.gov/about/visitorsecurity.htm

Access to the entire NIH building 12 complex is controlled. A security guard is stationed at the main entrance of the complex, 24 hours a day, seven days a week. Anyone entering the building must display a valid government ID showing a current photo identification, or register with the security guard to acquire a temporary visitor's badge. Badge readers control all other external entrances and surveillance cameras monitor building access from multiple locations.

Machine Room

The CIT enterprise systems are all housed in the NIH building 12 complex machine room. Physical controls that restrict access to the machine room include:

- Badge readers are installed on all entrances to the machine room.
- Badge reader access privileges are only granted to individuals who require frequent and regular access to the computers in the machine room.
- Procedures are in place to annually certify the holders of machine room badge reader access privileges.
- Individuals such as equipment repair persons, who must have unescorted access to the computer room, obtain a fading badge which allows access for a limited time.
- Everyone else must display an "Escort Required" badge and be accompanied by a person authorized for unescorted access to the computer room.

The machine room is equipped with smoke detectors and an adequate number of fire extinguishers to contain small fires. The NIH building 12 complex has sufficient fire protection due to its close proximity to the NIH fire department.

UPS System
The machine room equipment is protected from surges or drops in power supply and power interruptions by an uninterruptible power supply (UPS) system. The UPS system is designed to provide all electrical services to the machine room area. When an interruption occurs, power is supplied by a battery backup system that provides up to 30 minutes of operating capability. Beyond 30 minutes, diesel generators provide more than 24 hours of operation per tank of fuel.

The UPS system has more than 50% excess capacity. Moreover, the batteries, monitoring and control equipment, and diesel generators all are configured in three redundant sections. Failure of any one section will result in no more than a one-third loss of capability, leaving more than adequate capacity to support all ongoing services until power is restored.

4.2 PASSWORDS

Passwords are the keys that allow access to the enterprise systems. Therefore, it is important to ensure that strong passwords (not easily guessed) are used and that passwords are protected from exposure to unauthorized individuals. To this end, password controls enforced on Titan require that:

- passwords be a minimum length of 6 characters
- passwords must be changed every 180 days
- the previous 5 passwords may not be reused when changing passwords

Users can help to ensure that passwords are not easily guessed by following these simple guidelines:

- Construct a mnemonic password; i.e., think of a phrase and use the first letter of each word to create the password.
- Devise passwords that include combinations of letters, numbers, and special characters, preferably embedding the numbers and special characters within the password, not at the beginning or end.
- Do not choose passwords that are the same as the login names (USERids).
- Do not choose passwords with personal associations (e.g., names of relatives or pets, phone numbers, license plate numbers).
- Do not use repeated or obvious sequences (e.g., the same alphabetic character repeated 6 times, alphabetic run, keyboard sequence).

Users can help protect their passwords by following these procedures:

- Do not write down the password and leave it near your workstation.
- Do not divulge your password to any other individual. As a rule, CIT staff never request user passwords. Exceptions occur when the staff member may need to log on as the individual when all other avenues of problem resolution have been exhausted. If a staff member initiates a contact and requests a password, ask for the individual's name and call back through the TASC help desk before fulfilling the request. Be sure to change your password after the problem has been resolved.
- Use emulator software that supports either masking or suppressing the printing of the password as it is entered.
- Change your password more frequently than every 180 days. Passwords can be changed using the Change RACF Password option of Web RACF at:

  http://titan.nih.gov/racf

  For specific information regarding RACF passwords, see Section 4.7.1.

Users should be careful when entering their passwords. Repeated errors in attempting to supply a password are logged as a security violation. Excessive failed attempts will cause the USERid to be revoked (i.e., be unusable) until the security coordinator makes a formal response to the violation notification.

If you forget your password, ask your account sponsor or security coordinator to reset it.

4.3 INPUT/OUTPUT CONTROLS

Tapes

CIT processes two categories of tapes:

- NIH-owned – These tapes are available for assignment to users for storing data and remain under the control of the tape inventory system
- "foreign" (or "special") –These tapes are owned and supplied by users and are not under the control of the tape inventory system. For additional information on foreign tapes, see Section 10.2.4.

RACF security protects the data stored on all NIH-owned tapes. Data on foreign tapes is not protected by RACF controls.

Foreign tapes are submitted to the Output Distribution Services counter at the Bethesda campus. Parklawn customers can submit their tape(s) by placing them in their output box at the CIT Offsite Distribution Center located in the Parklawn building (room 2B-70), and then logging them in on the sheet located by the window. The courier will then know to pick up

the tapes. (See Section 5.6.1.3 for information on the courier service.) All foreign tapes must be logged in on this sheet.

NIH-owned tapes may not be removed from the NIH Computer Center. Users may copy the information from a NIH tape to either a tape that they supply or from a pool of tapes available for purchase from NIH.

Printed output
Printed output is placed in the locked boxes outside the computer room. Only users who know the correct box access code can access the boxes. See Section 5.6.1 for further details on the locked boxes.

Users have the option of printing "PRIVATE" on the header and trailer pages of the printed output containing sensitive information. For more information see Section 5.6.

4.4 SECURITY VIOLATIONS

CIT monitors the security status of Titan and takes immediate action if there is an apparent breach of security. USERids related to any security violation are automatically revoked.

The NIH Computer Center security investigators contact the security coordinator or alternate by telephone and send confirming e-mail detailing the specific circumstances of the violation. The security coordinator is responsible for investigating and resolving the apparent violation. When satisfied that no improper use of the account occurred, the security coordinator or alternate can reactivate the USERid through Web Sponsor. No further communication with the NIH investigators is required unless the investigation indicated a security breach did, in fact, occur.

The NIH security investigators are available to assist with any aspect of the investigation. They may be reached by calling the TASC help desk.

If users discover apparent breaches of security, such as discovering that an unknown person may have used their USERid, they should immediately notify their security coordinator or account sponsor. For general security questions contact the DCSS Security Coordinator.

4.5 DISASTER RECOVERY

With today's near total dependence on automated information systems to support critical organizational functions, interruption of those services could have severe consequences. Without adequate planning, an organization will have a difficult time recovering from an event that causes a long-term interruption to information system services.

CIT has a disaster recovery program to provide a foundation for users' disaster recovery planning. The CIT disaster recovery program covers Titan and EOS. CIT charges for participation in the disaster recovery program (see Section 3.1). Charges for those

applications that require additional hardware at the hot site or other heightened levels of support will be individually determined.

Account sponsors must enroll their applications in the disaster recovery program for their applications to be covered during a prolonged interruption to services. Contact the Disaster Recovery (DR) Coordinator to participate or to answer any questions regarding the program. See Section 1.3 for the telephone listing.

Features of the disaster recovery program include:

- Every week, CIT creates full volume backups of all Titan volumes, all database volumes, all private volumes, and all public volumes used for permanent data storage. These weekly dumps are written simultaneously to two separate automated tape libraries (ATLs); one located in the Computer Center and the second, located outside Baltimore, Maryland. Both backups are cycled through six sets of tapes so that six successive weeks worth of backups are always maintained.
- CIT has a contract with a commercial vendor to provide sufficient computer services to support the participating applications at a fully operational data center, a *hot site*, if and when a disaster causes an extended interruption to computer services.
- CIT schedules and conducts twice-yearly tests of the disaster recovery plan. Testing occurs over a two-day period with the first day dedicated to testing system recovery procedures and the second day set aside for customers to test their recovery procedures.
- Participants in the program receive on-going customer support for disaster recovery planning and hot-site preparation.

In the event of a disaster that requires CIT to move operations to the hot site, CIT will restore the applications and data for the participating applications. There is no guarantee that other applications will be serviced following a disaster.

The CIT disaster recovery program is detailed in the *NIH Computer Center Disaster Recovery Plan*. A copy can be found at:

http://datacenter.cit.nih.gov/pdf/disasterplan.pdf

4.6 SECURITY COORDINATORS

Each user organization must have a security (RACF) coordinator. This function belongs to the account sponsor until the sponsor designates a security coordinator. (See Section 2.1.) The security coordinator may be a contractor. The security coordinator carries out the following functions:

- serves as the point of contact for CIT security matters
- implements the account organization's password change policy
- performs RACF functions for users of an account

- changes passwords
- revokes and resumes RACF access
- displays RACF password activity dates

- sets authorities for RACF account group
  - creates and maintains generic profiles
  - designates others to create generic profiles
- changes passwords for Helix, ALW, and Parachute accounts

The security coordinator carries out many of these functions through Web Sponsor and Web RACF.

4.7 RESOURCE ACCESS CONTROL FACILITY (RACF)

Titan provides comprehensive data security through the Resource Access Control Facility (RACF). RACF is a security system that protects a data set by limiting who can access the data set and how it can be used (e.g., read, update). All data sets created at the NIH Computer Center are automatically protected by RACF through the use of generic profiles.

RACF also controls logon and batch submission. The IBM OS Password Protection facility cannot be used at the NIH Computer Center.

Each organization must assign a security coordinator. The security coordinator is responsible for the implementation standards of RACF within the agency. Users who need password assistance require access to resources that are not currently available to them, or have other similar RACF problems should contact their security coordinator. TASC help desk consultants cannot help the user in these situations. For additional information about security coordinators, see Section 4.6

RACF documentation is available through the CIT publication service (under the IBM Utilities category). See Section 5.4.1.

4.7.1 RACF Passwords

Each user is assigned a password when registered. This password allows access to Titan services. The password has the following characteristics:

- The password must be 6 to 8 alphabetic or numeric characters and cannot be the same as the USERid.
- RACF passwords expire every 6 months (180 days).
- Users can change their passwords through Web RACF (see Section 4.7.4).
- When a RACF password expires, you may not reset it to any of your 5 previous passwords.

Resetting Forgotten Passwords
Users who forget their passwords will not be able to log on. Due to the design of RACF, it is impossible to determine the password for a USERid.

Using Web Sponsor
Account sponsors and security coordinators can reset forgotten passwords for users in their organization through Web Sponsor. If you require further assistance concerning forgotten passwords, contact the TASC help desk. For information about choosing passwords, see Section 4.2.

Using Password Reset
Users associated with NIH, who have an NIH Login, can reset their Titan passwords using the Password Reset Web page. Go to:

http://silk.nih.gov/passwordset

For more information on resetting forgotten passwords, go to:

http://silk.nih.gov/silk/sponsorinfo

4.7.2 RACF Definitions

Users should be familiar with the following RACF terms in order to use the RACF facilities effectively:

RACFid	the Titan USERid
PASSWORD	a protection for the RACFid. The password is a series of six to eight characters, specified by the user. The password must consist of alphanumeric or national ($, @, and #) characters. Passwords expire automatically after being in use for 6 months; they can be changed through the Change RACF Password function of Web RACF.
RACF GROUP	or RACF Account Group - is the same as the user's account. Each RACFid must be registered to one (and only one) account. A RACF Group may have multiple RACFids registered to it.
USER-DEFINED GROUP	also called @group - a collection of RACFids that can be treated as a single entity for the purpose of data set protection. Each user-defined group has three components: a two-to-eight character name (of the form @name), an owner, and member RACFids. RACF groups offer a convenient way to control access to one or more data sets. When you protect a data set you specify an access list of users who will be able to read or update the data set. If the access list includes RACF groups, you can maintain a single RACF group containing the RACFids of persons who are able to access your data sets.

OWNER

the RACFid with the authority to perform RACF functions that no other RACFid can perform. There is an owner for each RACFid, RACF group, user-defined group, and protected data set.

- The owner of a RACF group can authorize other RACFids to protect data sets stored under that RACF group.

  A security coordinator for an account may choose to store shared data with names beginning with the account. By designating which users have CREATE authority within an account group, the account coordinator can allow specific members of the group to define the security to be applied to that shared data.
- The owner of a user-defined group is established when the group is established. The owner is the group member RACFid with authority to add and remove members and delete the group.
- The owner of a data set is established through the RACF Profiles area of Web RACF, and is the RACFid of a user who can authorize other users (both individuals and user-defined groups) to access the data set.

The owner is the only person allowed to change ownership. The owner of a data set can be changed in the RACF Profiles area (Change owner of RACF profile) of Web. The owner of a user-defined group can be changed in the RACF Groups area (Change owner of a group) of Web RACF.

UNIVERSAL ACCESS (UACC)

established in the RACF Profiles area of the Web RACF facility. It is used to establish initial protection for the data set. The Universal Access specifies the default access to the data set for users who have not been specifically authorized to access the data set.

The choices are:

NONE	Allow no access
READ	Allow only read access
UPDATE	Allow read and write access
ALTER	Allow read, write, scratch, and rename access

To change the UACC, select the Change Universal Access function in Web RACF.

ACCESS LIST	the list of RACFids and user-defined groups that have been authorized to access the data set, and the level of access (NONE, READ, UPDATE, or ALTER) for each. The access list is saved in a system database and is not part of the actual data set. The access list is created and changed through the RACF Profiles area of Web RACF. To display the access list, use the RACF Profiles (Display (RACF profile for a data set)) area of Web RACF. In addition to the authorities listed in the access list, any batch job or interactive session with a RACFid that is the same as the USERid in the high level prefix of a data set will have ALTER access to the data set.
GENERIC PROFILE	a profile that uses special characters (%, *, **) to create a "mask" that is compared against the actual name of a given data set and, if matched, defines the protection for that data set. The use of generic profiles is highly recommended. See Section 4.7.3.
DISCRETE PROFILE	RACF protection for only one data set. The name of the discrete profile matches the name of the data set protected. See Section 4.7.3.
SPECIAL CHARACTERS (Only one ** special character is allowed per profile).	the set of characters (%, *, **) that are used in the profile name to create a "mask." If no special characters are used, the generic profile only applies to one data set, much like a discrete profile, though using a generic profile to protect a single data set is not recommended.

% special character matches one character. There may be one or more in a profile. For example, $III.DATA%%%. TEST would protect the data set $III.DATAMIN.TEST.

* special character matches zero or more characters until the end of the qualifier. It only applies to one qualifier, that is, the generic profile $III.AB.CD* would protect data sets $III.AB.CD or $III.AB.CDEF, but would not protect data set $III.AB.CD.EF.

Used as a qualifier at the end of a profile to match one qualifier until the end of the data set name. For example, the generic profile $III.AB.CD.* would protect data set $III.AB.CD.EFG, but would not protect data set $III.AB.CD.EF.GH.

**	special character matches zero or more qualifiers. For example, $III.AB.CD.** would protect $III.AB.CD or $III.AB.CD.EFG, but would not protect the data set $III.ABC.DEF. Note that the ** must appear immediately after a period (.), for example, $III.ABC.DE** would be an invalid profile.

4.7.3 Protecting Data Sets

All disk and tape data on Titan must have a RACF profile. To establish the level of protection needed, use the RACF Profiles area (Protect a data set) in Web RACF. When a new USERid is created, the account sponsor specifies a default level of access (UACC) for all data sets created, with that USERid as the high level qualifier.

There are two methods for protecting data sets with RACF—generic profiles and discrete profiles.

Generic Profiles

Generic profiles allow users to create a single profile that protects multiple data sets, and to create a profile for a data set that remains in effect even when the data set is scratched and reallocated. Using Web RACF, go to the RACF Profiles (Protect a data set) area to create a generic profile.

By using the special characters %, *, ** in the profile name, you can create a data set "mask" that is compared against the actual name of the data set. If the data set name matches the mask, it receives the protection defined by the RACF profile. If none of the special characters are used in the generic profile, only the data set whose name exactly matches the profile is protected. These characters may be used alone or in combination to produce highly flexible generic profile names.

For example, the generic profile

AAAAIII.**

protects all data sets stored under USERid AAAAIII.

The profile

$III.QRST*.**

protects all data sets stored under USERid $III whose names begin QRST

RACF provides the following benefits for data set protection:

- With RACF generic definitions you can be very selective as to which data sets are protected based on their names, and you can have different generic definitions for different sets of names.
- Your associates will be given access transparently (if they are authorized to it).

Discrete Profiles
A discrete profile can only protect a single data set. If you are currently using discrete RACF profiles, you will probably find it more convenient to use generic profiles for the following reasons:

- If a data set with a discrete profile is scratched or deleted, the RACF protection also disappears.
- If the data set is later recreated, the discrete profile will not be automatically recreated. Instead, the data set will be protected by an existing generic profile.
- Web RACF does not permit users to set up discrete profiles. To set up a discrete profile, you must use TSO.

Converting to generic profiles is simplified by the fact that if both generic and discrete profiles protect a data set, the discrete profile takes precedence. Therefore, you can create the necessary generic profiles and then DELETE the discrete profiles afterwards. As the discrete profiles are removed, the generic profiles will provide the protection.

The following tables were extracted from an IBM RACF manual and provide a summary of generic profile naming conventions.

Figure 4-1. Generic Profile Names with Special Characters at the End

GENERIC DATA SET PROFILE NAMES CREATED WITH ENHANCED GENERIC NAMING ACTIVE—ASTERISK AND DOUBLE ASTERISK AT THE END			
Profile Name	AB.CD*	AB.CD.*	AB.CD.**
Resources protected by the profile	AB.CD AB.CDEF	AB.CD.EF AB.CD.XY	AB.CD AB.CD.EF AB.CD.EF.GH
Resources not protected by the profile	AB.CD.EF AB.CD.EF.GH AB.CD.XY ABC.DEF	AB.CD AB.CDEF AB.CD.EF.GH ABC.DEF	AB.CDEF AB.CDE.FG ABC.DEF
Profile Name	AB.CD*.**	AB.CD.*.**	
Resources protected by the profile	AB.CD AB.CD.EF AB.CDEF AB.CDEF.GH AB.CD.EF.GH AB.CD.XY	AB.CD.EF AB.CD.EF.GH AB.CD.XY	
Resources not protected by the profile	ABC.DEF	ABC.DEF AB.CDEF AB.CDEF.GH AB.CD ABC.XY.XY.EF	

Source: *The Resource Access Control Facility; RACF Command Language Reference, Version 1, Release 9* (Appendix A) IBM, SC28-0733-12

Figure 4-2. Generic Profile Names with Special Characters in the Middle

GENERIC DATA SET PROFILE NAMES CREATED WITH ENHANCED GENERIC NAMING—ASTERISK AND DOUBLE ASTERISK, OR PERCENT SIGN IN THE MIDDLE			
Profile Name	ABC.%EF	AB.*.CD	AB.**.CD
Resources protected by the profile	ABC.DEF ABC.XEF	AB.CD.CD	AB.CD AB.X.CD AB.X.Y.CD
Resources not protected by the profile	ABC.DEFGHI ABC.DEF.GHI ABC.DDEF	AB.CD AB.CD.EF AB.CDEF ABC.DEF ABC.XY.CD ABC.XY.XY.CD	AB.CD.EF AB.CDEF ABC.X.CD.EF ABC.DEF ABC.YCD

Source: *The Resource Access Control Facility; RACF Command Language Reference, Version 1, Release 9* (Appendix A) IBM, SC28-0733-12

4.7.4 Web RACF

Registered users of Titan can access the RACF facility from the Web and issue RACF commands from any browser. To access Web RACF for Titan, go to:

https://titan.nih.gov/racf

Titan users can submit information through the Web and Web RACF formats all RACF commands. The commands go to the mainframe system for processing and the user receives a response indicating successful completion or an appropriate RACF message.

Users must have a valid Titan USERid and password in order to submit any RACF request. The USERid entered must be authorized to perform any RACF function requested. Generally, this means that only the owner (creator) of a data set can change RACF access to that data set.

Among its functions, Web RACF allows users to:

- change the user's RACF password
- permit individual, universal, and group access to mainframe data sets
- set up generic profiles for data set protection
- change the Universal Access (UACC) for a profile
- change the owner of the profile
- view the RACF profile of a mainframe data set
- create or delete RACF groups
- add or remove users from a RACF group

- change the owner of a RACF group
- display attributes of a RACF group
- control which users can submit, read (fetch)/purge batch jobs

Web RACF allows security coordinators to:

- perform RACF functions for users of an account
  - change passwords
  - revoke and resume RACF access

- set authorities for RACF account group
  - create and maintain generic profiles
  - designate others to create generic profiles

Typical Tasks
The following table describes how to perform some typical tasks using Web RACF.

Figure 4-3. RACF Typical Tasks

Task	Web RACF Area
Change the password.	Change RACF Password
Establish protection for a data set. (Note: protecting a data set establishes a UACC and gives the user whose RACFid is in the high level prefix of the data set ALTER authority.)	RACF Profiles – Actions (Protect a data set)*
Give other users specific access to a protected data set.	RACF Profiles – Actions (Add user to access list to data set)*
Change the access of a specific user.	RACF Profiles – Actions (Add user to access list to data set)*
Remove the access given to a user.	RACF Profiles – Actions (Remove user from access list)*
Change the UACC of a protected data set.	RACF Profiles – Actions (Change UACC)*
Create a user-defined RACF group.	RACF Groups – Actions (Create a RACF group)

Task	Web RACF Area
Add users to a user-defined RACF group.	RACF Groups – Actions (Add users to a group)
Remove users from a user-defined RACF group.	RACF Groups – Actions (Remove users from a group)
Delete a user-defined RACF group.	RACF Groups – Actions (Delete a RACF group)
See the group names in which a RACFid is a member.	RACF Groups – Display (Groups containing user)
See which RACFids have been given specific access to a protected data set. (Note: The output from this function will also show the UACC of the data set.)	RACF Profiles – Display (RACF profile for a data set)

* GENERIC option recommended

4.7.5 TSO RACF

You can execute RACF commands directly through TSO or in a batch job.

Commands

The RACF commands available to the user under TSO are:

ADDSD	add RACF protection to an existing data set to control access to it
	define to RACF a data set that is brought from another system where it was also RACF-protected
ALTDSD	modify the existing profile of a RACF-protected data set
	protect a single volume of a multi-volume, non-VSAM data set (At least one volume must be RACF-protected.)
	remove RACF protection from a single volume of a multi-volume, non-VSAM data set (The last volume cannot be deleted from the profile.)
ALTUSER	change the name field or default group

DELDSD	remove RACF protection from a data set
	remove a data set profile when moving a RACF-protected data set to another system that has RACF support
LISTDSD	list details of data set profiles
PASSWORD	change the current password to a new one
	change the time interval the password is valid
PERMIT	grant level of access to a resource to specific RACF-defined users or groups
	remove authority to access a resource from specific RACF-defined users or groups
	change the level of access to a resource for specific users or groups
	copy the list of authorized users from one resource profile to another and modify the new list as required

Level of Access
The following operands define the levels of access that a user may have over a given resource:

READ	The specified user or group can access the resource for the purpose of reading only.
UPDATE	The specified user or group can access the resource for the purpose of reading or writing.
ALTER	The specified user or group has control over the resource and can authorize other users and/or groups of users, access to the resource.
CONTROL	This access authority used only for VSAM data sets. The specified user or group has access authority that is equivalent to the VSAM control password. The VSAM control password allows a user to perform control interval access and to retrieve, update, insert, or delete records in a VSAM data set.
NONE	The specified user or group is denied access to the resource.

Entering RACF Commands
RACF commands can be entered through the Web, TSO, or a batch job. A cataloged procedure, BATCHTSO, is available for entering RACF commands in a batch job. The formats for the RACF commands are the same in TSO and batch. The TSO convention governing the use of single quotes around data set names applies (i.e., a data set name enclosed in single quotes will be processed as entered, but a data set name not enclosed in single quotes will have the TSO USERid added as a prefix automatically before processing). If the latter method is used, a PROFILE statement must precede the RACF command.

The following example illustrates the use of BATCHTSO:

```
//STEPNAME EXEC BATCHTSO
//SYSIN    DD *
PROFILE    PREFIX(userid)
  (RACF commands)
       "
/*
```

Any number of RACF commands may follow the SYSIN DD statement. For further information, refer to the *Titan Batch Processing* manual.

Changing a Password
To change your password:

- Use Web RACF (see Section 4.7.4). This is the preferred method.
- At the TSO logon panel, enter a new password in the New Password field.

  `New Password ===> newpass`

  For details about the TSO logon panel method, see Section 7.2.1.

- Use the RACF "PASSWORD" command during a TSO session.

  `PASSWORD PASSWORD` (ENTER)

  The system then prompts you to enter your old and new passwords

- Submit the RACF "PASSWORD" command in BATCHTSO.

```
//STEPNAME EXEC BATCHTSO
//SYSIN    DD *
PASSWORD PASSWORD(oldpass newpass)
```

Allowing Individuals or Groups to Use a Protected Data set
The PERMIT command grants a specific level of access to other users of a data set. The command can be entered by anyone with the ALTER level of control for the data set. For example:

```
PERMIT dsname ID(xxx) ACCESS(level of access)
```

Where: "xxx" may be the USERid or RACF group. Multiple USERids or RACF groups may be specified in the ID field with separating blanks or commas. Level of access entries and meanings are described under "Level of Access," earlier in this section.

Allowing Universal Access to a Protected Data set
The ALTDSD command with the UACC operand grants **all** users a specific level of access for a data set. The format is:

```
ALTDSD datasetname UACC(access-authority)
```

4.7.6 Tape Data Security

Tape data set security on Titan is handled by RACF permissions on a data set rather than volume basis. Data set protection depends on the RACF profiles in place and applies to any data set, regardless of whether it is on tape or disk.

Note: If you wish to use the former North System tape naming conventions of aaa.iii.dataname, the security coordinator must create RACF profiles of the form AAA.III.** and must permit the $III USERid ALTER access to that profile. Optionally, the security coordinator can set the owner for the AAA.III.** RACF profile as $III. This allows the $III user to use RACF commands to permit other users access to data sets on tape. Unless these RACF permissions are given, the generic profiles currently in use for disk data sets will be used and some tape jobs may fail.

5 USER SUPPORT

Many types of assistance are available to users to help them make efficient and effective use of the Titan system. The CIT Technical Assistance and Support Center (TASC) help desk supplies many of these services with support from the staff of the NIH Computer Center. See Section 1.3.1 for useful phone numbers. See Section 1.1 to learn about other CIT services provided by the individual organizational components of CIT.

The comprehensive consulting services offered to customers by CIT include problem resolution and assistance with Titan services described in this manual. CIT can assist users on connectivity strategies and services, including interactive login and file transfer services that are part of NIHnet. Consultants are also available when a system problem occurs that prevents a user's work from continuing—a situation which requires a quick response for a solution/circumvention.

Major Sources of Help

- Call the TASC help desk. See Section 5.2.1.
- Submit a CIT Service Request to report problems, make suggestions, apply for refunds, and request consulting assistance. Enter your request via the Web at:

  http://support.cit.nih.gov

  or by e-mail. See Section 5.2.2 for further information.

- Take a class from the CIT Computer Training Program. See Section 5.3.
- Refer to documentation describing the services provided by the NIH Computer Center. See Section 5.4.
- Consult the CIT Web pages for additional information on specific services. Go to:

  http://cit.nih.gov

5.1 SOFTWARE SUPPORT

The CIT's Technical Assistance and Support Center (TASC) help desk offers consulting and assistance on a variety of software and services. The TASC help desk will try to answer questions on any product used by CIT customers. Titan software and services, specifically documented in this guide, receive a high level of consulting. Support comes in the form of responses to CIT Service Requests, technical documentation, maintenance, advance announcement of all changes, and full conversion support (if the product is upgraded or discontinued).

Figure 5-1 lists software facilities available to Titan customers for application development.

Figure 5-1. Supported Software

Category	Software Facilities	Section
Operating System	OS/390 Operating System and Job Control Language	7.1.1
SILK Web Facilities	Customer Locator	7.5.1
	Customized Servers	
	Display or Purge Jobs	
	Easymail	
	Export SouthTape	
	Formsmail	
	Human Resources Information and Benefit System (HRIBS)	
	Job Scheduler	
	Manage Migrated Data Sets	
	Model 204	
	Password Reset	
	Public Server	
	Purchase Tape	
	RACF	
	Secure Server	
	TSO Commands	
	View/Download Private Data Sets	
	View/Download Public Data Sets	
	WEB Listoff	
	Web Sponsor	
	Web Sponsor via NIH Login	
	Web Submit	
	Web Tape	
Database Services	Model 204 (Fast Unload, Fast Reorg)	7.3.2
	ADABAS	7.3.1
	IMS	7.3.3
	Oracle client services	7.3.4
	DB2	7.3.4
Interactive Systems	CICS	7.2.2
	TSO	7.2.1
	ISPF	7.2.1.1
	MAX	7.2.1.2
	MVS/QuickRef	7.2.1.3
	ACS WYLBUR	7.2.3
	NIH WYLBUR	7.2.1.4

Category	Software Facilities	Section
Programming Languages	PL/I for OS and VM	7.4.3
	COBOL	7.4.1
	High Level Assembler	7.4.4
	REXX	7.4.5
	VS FORTRAN	7.4.2
Scientific Statistical Systems	SAS	7.6.1
	SPSS	7.6.2
Connectivity/Network	CONNECT:Direct	6.4.4
	QWS3270 PLUS	6.2.2
	QWS3270 Secure	6.2.2
	WS_FTP Pro	6.4.1
	NBARS (TSM Software)	10.3
	TN3270 for the Macintosh	6.2.3.1
	TN3270X for the Macintosh	6.2.3.1
	IND$FILE	6.4.5
Other	BookManager	7.8
	IOF	7.7
	VPS printing service	6.5.4
	VISION:Builder[4]	7.10
	VISION:Report[5]	7.10
	IRS[6]	7.10

[4] Limited support from CIT
[5] Limited support from CIT
[6] Limited support from CIT

5.2 CONSULTING SERVICES

Consulting services are offered to all registered users, without charge, through the TASC help desk. CIT provides an online self-help service at:

http://support.cit.nih.gov

5.2.1 Telephone and Walk-in Assistance

The TASC help desk provides telephone and walk-in customer support for the services and facilities supported for the enterprise systems. Call (301) 594-6248. The TASC help desk is located at 10401 Fernwood Road, Suite 300, Bethesda, Maryland, 20817. Refer to Section 1.4 for the hours of operation. Users can e-mail the TASC help desk at tasc@nih.gov. Consulting assistance is available on all software supported by the NIH Computer Center, as well as questions concerning LANs, networking and NIHnet (e.g., electronic mail addressing, connectivity with the enterprise systems, and network connectivity strategies).

The TASC help desk consultants can answer most questions, but will refer more complex problems to subject matter specialists. The expertise and experience of the senior staff members are available to any Computer Center user who calls the TASC help desk.

Regardless of the software you are using, if you think that an action you are taking during an interactive session or while running a batch job is causing the system to crash, you must contact the TASC help desk immediately. If you cannot reach the TASC help desk, submit a CIT Service Request and suspend all action until you are notified. Do not try to modify the command or job and resubmit it. (See Section 5.2.2 for information on submitting CIT Service Requests.)

Users who plan to acquire or develop large systems at the NIH Computer Center should contact CIT to set up a meeting to discuss the proposed software in detail. This will help ensure that the new system will adhere to the job standards and will not conflict with published restrictions.

5.2.2 CIT Service Request

Users can report problems, request refunds, and communicate suggestions, comments, and needs to CIT through a Web-based CIT Service Request. The information from these reports help the staff formulate future policies, plan systems changes, and inform users of common trouble areas. CIT Service Requests can deal with supported software, hardware, network connections, or service for enterprise systems (including Titan) facilities. The staff will not be able to respond to problems with software or hardware (e.g., workstations) not supported directly by CIT. The staff responds to a CIT Service Request by telephone or by electronic mail.

5.2.2.1 Submitting a CIT Service Request

Every CIT Service Request should include a complete description of the problem. Section 5.2.2.2 describes the documentation that should accompany a CIT Service Request. CIT uses Remedy's Action Request System (AR) to track Service Requests internally. This system automatically creates a "ticket" that is associated with a user's problem. When you submit a CIT Service Request, the system will notify you of the number for the Remedy "ticket" for future reference.

To submit a CIT Service Request, go to:

http://support.cit.nih.gov

and select Create a Service Request Online.

Verify your customer information (name, telephone number, etc.) since a CIT staff member may have to contact you before attempting to solve the problem.

CIT Service Requests can also be submitted by sending e-mail to tasc@nih.gov.

Canceling a CIT Service Request

If users wish to cancel a CIT Service Request (e.g., the problem has been solved or they no longer require an answer), they should notify the TASC help desk immediately via phone or submit another CIT Service Request to cancel the previous one.

5.2.2.2 Providing Documentation for a CIT Service Request

For any CIT Service Request, whether submitted via e-mail or the Web, include a description of the suggestion, problem, or complaint that clearly, but briefly, explains the area of concern. The problem description should include all information (for example, data set names, job numbers, etc.) needed to resolve the problem.

The amount of documentation needed depends on the severity, complexity, and nature of the problem. For printing problems, extensive listings may not be required. Often the output header and trailer sheets and a few pages showing the problem are sufficient to determine the problem.

5.2.2.3 Requesting a Refund

To obtain a refund, a user must submit a CIT Service Request, either by e-mail or through the Web. See Section 3.2.2 for more information about refunds.

5.2.2.4 CIT Service Request Priority

When you submit a CIT Service Request, designate the impact that the problem has on your work—none, non-critical, work disruption, or work stoppage—from the pull-down window.

CIT Service Requests that indicate a high level of impact on a user's work are examined frequently throughout the workday, and receive the highest priority for resolution. For especially severe or critical problems, it is important to provide all available problem-related information with the Service Request. Also, it may be necessary for the staff to contact you with additional questions; thus, it is important that CIT have accurate contact information available with the Service Request. Whenever possible, CIT staff will try to provide a temporary solution or bypass for the problem. Permanent fixes typically take longer since they may require coordination with the software developer or vendor. Before submitting a CIT Service Request describing a problem that severely impacts production (not test or development) work and cannot wait, it is often useful to discuss the problem with the TASC help desk consultants.

Non-critical CIT Service Requests are examined each workday and addressed as quickly as feasible.

5.2.3 Network Assistance

The CIT Division of Network Systems and Telecommunications (DNST) monitors network services equipment at the NIH Computer Center. Users experiencing problems involving communications, telephone circuits, and terminals should report them by calling the TASC help desk.

NIHnet provides connectivity services to LANs over a wide area, both on and off the NIH campus. The technical LAN coordinators (TLCs) are the LANs' representatives for coordinating the connection of all LANs to NIHnet and providing input for future NIHnet enhancements. They serve as the primary contact between the users of the LAN and CIT. The TLC will be contacted in the event of any problems or questions related to the LAN's connection to the wide area network. Support for the NIHnet wide area network requires a collaborative effort between CIT and TLCs.

If problems arise when using NIHnet connectivity services on a LAN, the first person to contact for help is the TLC. The TLC is very familiar with the LAN and is kept informed of the overall network status, including planned outages.

To learn the name of your TLC, contact the TASC help desk, or go to:

http://tlc.nih.gov

5.2.4 Database Assistance

There are additional forms of assistance available on database technologies. Contact the Database Technologies staff for telephone assistance. Refer to Section 1.3.1 for the Computer Services Directory.

For more information on database systems supported on Titan, use the Web to connect to:

http://titan.nih.gov

5.2.5 Assistance for Implementing Non-NIH Software

Users who are considering, or are in the process of acquiring or developing, a software package should contact CIT to arrange a meeting to discuss implementation. The purpose of this meeting is twofold:

- To ensure that the proposed software will comply with the NIH Computer Center standards and will not have a detrimental effect on other users. This compliance is mandatory in the open-shop environment at NIH.
- To help the NIH Computer Center staff project the resource requirements of the user community as a whole (e.g., additional resources such as online disks, etc.).

If a large system is designed without prior consultation with the appropriate Computer Center personnel, it may require extensive modification before it is implemented, or it may not be able to run at all. Avoid the necessity of "after the fact" changes—this can save substantial costs, staff-hours, etc. Prior consultation often results in a more efficient, bug-free, and more easily maintained system.

If possible, representatives of the vendor should be present together with the user, so that they can gain an insight into the NIH environment and, along with it, a more accurate estimate of the work it will take to make the system compatible with NIH's standards. The staff will help the vendor plan the changes and installation of the system. Such a meeting, held early in negotiations with the vendor, is an important step in insuring a smooth, economical, and hopefully rapid installation of the vendor's system.

Whenever possible, avoid the use of device-dependent data or programs. Software packages using these features could become unusable later if the NIH Computer Center upgrades its hardware.

Some software vendors charge for the use of their software based on the number of processor complexes on which the package may run. They may require the purchaser to supply processor complex serial numbers that are then checked by the software. The NIH Computer Center's configuration is relatively dynamic. Acquisition of a new processor complex, and particularly changes or additions to processor complex serial numbers cannot be announced in advance. Any contract to acquire software should include some allowance for the possibility of additional or replacement processor complexes.

Transferring disk data to the NIH Computer Center from other computer centers (which is done via tape) should be done using individual data sets. Attempting to restore data from a backup tape will often be unsuccessful because of hardware and software incompatibilities. See Section 6.4.6 for details.

For a list of the operating system software that cannot be used at this installation, see Section 7.1.1.2.

5.2.6 Telecommunications Assistance

The TASC help desk provides advice and assistance to users with a wide variety of telecommunications and connectivity problems. Users who suspect that communications hardware maintained by CIT may be causing their problems should contact the TASC help desk. CIT provides help with:

- mainframe connections via telnet
- remote access services (including Parachute)
- dedicated phone lines
- mainframe dialup ports
- modems
- DSUs/CSUs (data service units/channel service units)
- 3270 communications
- SNA cluster controllers
- RJE communications (including deregistration from service)
- LAN connections (communications problems)
- JES2/NJE node connections
- NIH telecommunications services (including NIH telephone systems and services)

5.2.7 Web-based Customer Support

The CIT Technical Assistance and Support Center (TASC) help desk offers a Web-based self-help service that users can access any time via the Customer Support Web site at:

http://support.cit.nih.gov

The online service provides answers to basic IT questions using the CIT Knowledge Base, displays up-to-the-minute IT news, lists frequently-asked questions (FAQs), and allows users to submit an online request for help for a specific problem.

5.2.7.1 CIT Knowledge Base

The CIT Knowledge Base (KB) is the database of technical support information and references to outside resources created, maintained, and used by TASC help desk consultants. It includes information on software products, instructions for changing passwords, e-mail client configuration, Listserv lists, and many other topics. You can access the KB from the CIT Customer Support Web site or by going to:

http://kb.nih.gov

CIT can also provide NIH organizations with their own closed knowledge domain. For further information, contact the TASC help desk.

5.3 TRAINING

The CIT Computer Training Program offers a variety of classroom courses to assist users in making effective use of computers at NIH. Many seminars address the uses of computers in science. A variety of self-study courses are also available. Descriptions of all classroom courses, seminars, and self-study courses provided by the CIT Computer Training Program are available through the Web. Course information is kept up-to-date; when a course fills early and a new session is scheduled, it will be shown. There is no charge for courses in the CIT program.

For training information and registration go to:

http://training.cit.nih.gov

The CIT Computer Training Program staff can answer any questions about these courses, give assistance in selecting the best course to fill specific needs, and even take your registration information over the phone. See Section 1.3 for the phone number.

As a convenience to NIH personnel, the CIT Computer Training Program Web site has links to other computer training programs available at NIH.

The CIT Computer Training Program fully accommodates students with disabilities. Classes are located in wheelchair-accessible buildings. People with disabilities are welcome to attend any course or seminar offered by the CIT Computer Training Program for which they have the appropriate professional background. Prospective students should inform the training staff if special assistance would be needed. For more information, see Section 1.7.

5.3.1 Classroom Training

There are three terms each year: fall, spring, and summer. Subjects include: personal computers, networks, Internet resources including Web facilities, the Titan mainframe system, computer security, database topics, Unix, SAS, NIH Data Warehouse information, and scientific seminars.

Whenever possible, special seminars will be scheduled to meet the needs of organizational groups. For information on scheduling a special seminar for your group, contact the staff of the CIT Computer Training Program through the TASC help desk.

Location

CIT classes generally meet in the on-campus classrooms, located in building 12A, or at the Fernwood Road location. Be sure to check the schedule for the training location.

5.3.2 Independent Training

A variety of self-instruction methods are offered for students who want to study independently. Full details and a complete list of independent training courses can be found at the CIT Computer Training Program Web site.

5.4 DOCUMENTATION

CIT offers a wide variety of online and hardcopy documentation to its users.

5.4.1 CIT Publication Service

CIT provides manuals for CIT supported systems and software. To order hard copy publications, view publications online, print manuals on the high-speed central printers, or print at your desktop printer, visit:

http://publications.cit.nih.gov

Each CIT or vendor document on the CIT publication pages is available through one or more of these options. To get started, select a category from the list on the left side of the CIT Publications page. After clicking on the title, you will see the list of available formats.

- online viewing via the View/Print On Demand Service via the Web in PDF format via Acrobat reader (with the option of printing at your local desktop printer). This is a free service, available to all users.
- central printing via the View/Print On Demand Service

  Many vendor manuals and CIT-written manuals can be printed in-house—double-sided, three-hole punched, on high-speed laser printers. The system prompts NIH Computer Center users for their logons before processing orders. One hard copy of each technical manual is provided free of charge to registered CIT customers. Users will incur charges when they request the printing of more than one copy of a manual at the central printers. Additionally, there is a charge for statistical software.
- view via a Web browser online
- hardcopy (traditional method). Some manuals (specific vendor manuals and older CIT manuals) are only available through the traditional ordering system. You must supply your logon. There is a choice of delivery options:
  - to your output box
  - by mail (within 24 hours)
  - personal pickup at TASC. (See Section 1.3.1.)

To order copies of printed documentation, provide either your Titan USERid or a Unix userid. Users must verify (and correct, if necessary) their customer information before placing an order online for a printed copy of documentation. Contact the TASC help desk for assistance with ordering or printing documentation.

You may subscribe to a publications interest list, and receive e-mail notification whenever a new manual is available. Go to the NIH Listserv page (http://list.nih.gov). Browse the list of listserv lists and select the CIT-DOC-RENEW list. Updates are not distributed unless they are specifically requested.

Anyone making active use of the NIH Computer Center is responsible for obtaining and consulting the publications related to the services they use. The CIT publication service allows users to update the address and telephone information so publications can be mailed efficiently.

User groups with many individuals at a single location are encouraged to establish a library of publications to be shared by the group. Each user may still obtain a personal copy of the publications used most frequently.

Almost all publications are given to users without charge. The NIH Computer Center absorbs the cost in its overhead (which is in turn paid for from computer charges). To be cost effective, some limits must be put on the documentation service. Each user should order only the publications currently needed; if others are needed later, they can be ordered at any time. An order for an unreasonable number of publications (e.g., one of every publication stocked) cannot be filled and will be delayed until the user can be contacted to determine which publications are really necessary. Each request for a special order of documentation is reviewed as it is received. Publications not listed in the online publications system will be given to a user only if the document describes facilities offered at the NIH Computer Center to its user community.

People who are not registered users may receive introductory publications. Requests from non-users for any other NIH Computer Center publications should be directed in writing to the Director, Division of Computer System Services.

If you have any questions concerning ordering documentation, contact the TASC help desk.

5.4.2 Online Documentation via BookManager

Use IBM BookManager on Titan to view online IBM technical documentation. Access the Titan system and connect to NIHTSO. Log on with your USERid and password. After the informational messages appear, hit Return. From the CIT/Titan Primary Option Menu, select C for Additional Products, and then select B for Books (BookManager).

For more information on BookManager, see Section 7.8.

5.5 CONTACT BETWEEN USERS AND CIT

The training and consulting services described earlier in this section comprise two-way communication between users and the NIH Computer Center. Input from users is a critical element in determining Computer Center goals, policy, and allocation of staff time. It greatly affects the quality and timeliness of the end products provided to the user community. The CIT Technical Assistance and Support Center (TASC) help desk provides information on setting up accounts, training, software, e-mail and a full range of technical issues. Suggestions on how to improve our service are always welcome. The CIT Service Request, described in Section 5.2.2, is an important communication tool for users who need help. Publications, such as *Interface*, are effective vehicles for Computer Center-user communication. The communication tools described in this section complement the general links described above.

5.5.1 Titan News

An important means of communicating timely information with mainframe users is *Titan News*. It is distributed through an e-mail list, CIT-TITAN-NEWS@LIST.NIH.GOV. This service allows CIT to send out important information, such as updates on outages, special events, equipment and software upgrades, technical information and other issues, at short notice.

For information about Listserv, or to join or leave a list, go to:

http://list.nih.gov

5.5.2 Electronic Mail

Electronic mail is a standard means of communication between users and CIT. Listserv lists offer users a way of subscribing to information relating to a particular topic. Find out more about the NIH Listserv service at:

http://list.nih.gov

If you need assistance, call the TASC help desk.

5.5.3 Message Facilities

Occasionally, in a computer center environment, changes to a published procedure must be quickly implemented. Titan has several methods for timely communications with its users:

Titan Hot News

Titan Hot News provides TSO and batch users with information concerning changes in operating schedules, software enhancements, and published procedures.

To access Hot News from ISPF, enter the command:

```
TSO HOTNEWS
```

CIT Hot News
CIT announces important messages concerning the status of its systems through the Hot News feature of the CIT Customer Support Web page at:

http://support.cit.nih.gov

System Broadcast Messages
A specific system, such as TSO, may send messages to all users of that system. Since this message facility is a feature of the individual system, only information of interest to the users of a particular system is broadcast in this manner.

Batch Listing Messages
Titan messages are displayed on Titan batch listings.

5.5.4 CIT-Sponsored Users Groups

There are several CIT-sponsored groups to help users exchange information in specific areas of interest. Contact the TASC help desk for further information. These groups include the following:

- Biomedical Research Mac Users Group (BRMUG) - Macintosh user support
- Molecular Modeling Interest Group - seminars on various molecular modeling topics to foster communication between NIH scientists concerning the methods and applications of molecular modeling
- The Account Sponsor Interest Group (ASIG) - an informal forum for discussion of issues important to sponsors, deregistration officials, and Titan account officials (e.g., billing coordinators, security coordinators). For more information, see Section 2.1.
- Desktop Support - seminars for anyone who is responsible for the setup, maintenance, and management of desktop computers, or for the support of desktop computer users (including onsite support and help desk consultants).

5.6 INPUT/OUTPUT DISTRIBUTION SERVICES

Jobs submitted locally or interactively without a "ROUTE" or "DEST" statement are printed at the Bethesda campus of the NIH Computer Center. Jobs submitted at an RJE station unless specifically "routed" to an alternate site will normally print at that RJE station. Customers in the Parklawn building can use the CIT Offsite Distribution Center at Parklawn (room 2B-70). For information on the courier service for the Parklawn building, see Section 5.6.1.3.

Computer output is either placed in assigned combination lock boxes or in "special handling" boxes. Only users who have been given the combination by their respective account sponsors have access to the lock boxes. Large volume output and "PRIVATE" output constitute the

"special handling" category. "Special handling" output at the Bethesda campus is distributed at the Output Distribution Services counter in building 12A. A color-coded card in the lock box will notify users when this material is at the counter. Before such output is released, the user must request it by job name and provide personal identification. "PRIVATE" output must be signed for by the user or by a designated representative.

The CIT Operations staff will call users at the Parklawn site when large volume output is ready to be delivered to Parklawn. "PRIVATE" output for Parklawn is handled on an individual basis. Please contact Output Distribution Services for details.

5.6.1 Output Boxes

CIT has output boxes available for its users at the Bethesda campus site and at the Parklawn building. Output boxes at the NIH Computer Center, both on the NIH Central campus and at the Parklawn building, are used primarily for output printed on the Computer Center's central printers. All Titan users have a default box number value assigned; however they can set or change their output box numbers.

Box Numbers

To see your output box number, go to Customer Locator at:

http://silk.nih.gov/locator

Enter your name or USERid, and select Display.

When you display your assigned box number you may see one of the following values:

nnnn or Pnnn	This is the valid numeric output box number.
NONE	An output box is not needed. This value is useful for Helix or Titan customers who use remote printers or printers attached to their desktop computers. Any output that is printed at the central printers incurs a printing charge but is thrown away.
NOBX	No box number has been set. Either a valid box number (nnnn or Pnnn) or NONE should be set.

If you do not specify a box number in your JCL, your assigned default box number is used. If, however, you specify a box number in your JCL (by using a former South System-style job card, a /*BOX statement, or a /*JOBPARM ROOM=bbbb statement), it overrides the default assignment.

If a box number is not provided in the JCL and the default output box setting is NOBX, the job will be rejected. Any output that prints on a central printer without a valid box number will be disposed of, and the user will be charged for printing.

How to Change Your Box Number
To change your output box number, select Set Box Number on the appropriate Customer Locator page. (See Section 1.3.2.) Your account sponsor can tell you the box numbers that are valid for your account and the entry code for the box you select. If you set a new box number, be sure to click the Update button on the Box Number Update page after you enter the new value.

If you have any questions on displaying or setting your assigned box number, contact the TASC help desk.

5.6.1.1 NIH Bethesda Site

There are locked output boxes at the Bethesda NIH campus—located next to the Output Distribution Services counter in building 12A. To access an output box you must enter the BAC (box access code) at a keypad located by the bank of output boxes. Contact the TASC help desk for information on obtaining an output box.

Boxes for Mailed Output
Users at a remote location should obtain a mailing box number (with an "M" prefix) so that output produced at the central facility can be mailed to them. Users who choose this service must accept full responsibility for delays, damage, or loss incurred in the mails and must limit the volume of output to be mailed to that which will fit in one 12 by 16 inch U.S. mail envelope (NIH Supply Number 7-7106). Box numbers are limited to 4 characters, including the M prefix.

5.6.1.2 Parklawn Site

All Titan output is printed at the NIH Bethesda site.

Titan USERids propagated from the former North System have a default output box, located at the Parklawn site, with a number prefaced by a P (for Parklawn). If you run a batch job on Titan, the output is routed to your Parklawn box number unless you specify otherwise by means of a `/*BOX` statement in your JCL. However, if you include a `/*BOX` statement, you need to include the P, since the `/*BOX` statement will override any default box number.

Note: The output will be placed according to the box number only. For example, if a job contains a `/*ROUTE OUTPUT NIHCU` statement but the box number begins with a "P," then the output will be placed in the box at Parklawn.

5.6.1.3 Courier Service

A courier service, provided by the NIH Computer Center, transfers tapes and printed output between the Bethesda campus and the Parklawn building. This service operates twice daily each weekday, arriving at Parklawn at around 8:00 a.m. and again around 2:00 p.m.

5.6.2 Misdirected Output

Occasionally output is misdirected because of a user error or mishandling by the NIH Computer Center. This can cause great frustration for the user who should have received it. If you locate misdirected output, please inform Output Distribution Services, on the NIH Bethesda campus building 12A, as soon as possible. See Section 1.3.1 for the telephone number.

6 NIH CONNECTIVITY AND NETWORK SERVICES

CIT provides network connectivity to Titan services. Users with NIHnet connections or Internet (TCP/IP) connectivity should take advantage of the high-speed network connections instead of using slower dialup (modem) connections. This section provides descriptions of the software products supported by CIT to provide that access and an overview of some of the network services provided at CIT. Contact the TASC help desk for all connectivity assistance, including software recommendations.

The Online Services Directory (Section 6.1) provides the Internet host names for network connections and the dialup access telephone numbers.

6.1 ACCESS TO SERVICES

Figure 6-1. Online Services Directory

Service	Internet Host Name	Dialup Access	Status
Titan			
TSO, DB2**, IMS (Full-Screen 3270)	TN3270.TITAN.NIH.GOV	N/A	301-594-6248
RJE Batch 2400-9600 bps (dialup)	N/A	301-480-0744	301-594-6248
Network File Transfer	FTP.TITAN.NIH.GOV	N/A	301-594-6248
Helix Systems			
SGI System 2400-33600 bps	HELIX.NIH.GOV	301-402-2222 800-358-2022*	301-594-6248
NIH Biowulf Cluster	BIOWULF.NIH.GOV	N/A	301-594-6248
NIHnet access through Parachute	N/A	301-402-6830 800-827-0124* 301- 951-6874 866-753-3457*	301-594-6248

NOTES:
Ten-digit dialing is required for all NIH/HHS phone numbers in the Rockville/Bethesda area. **This also affects dialup access to the NIH Computer Center's systems** (e.g., 301-480-0744).

N/A: Not Applicable

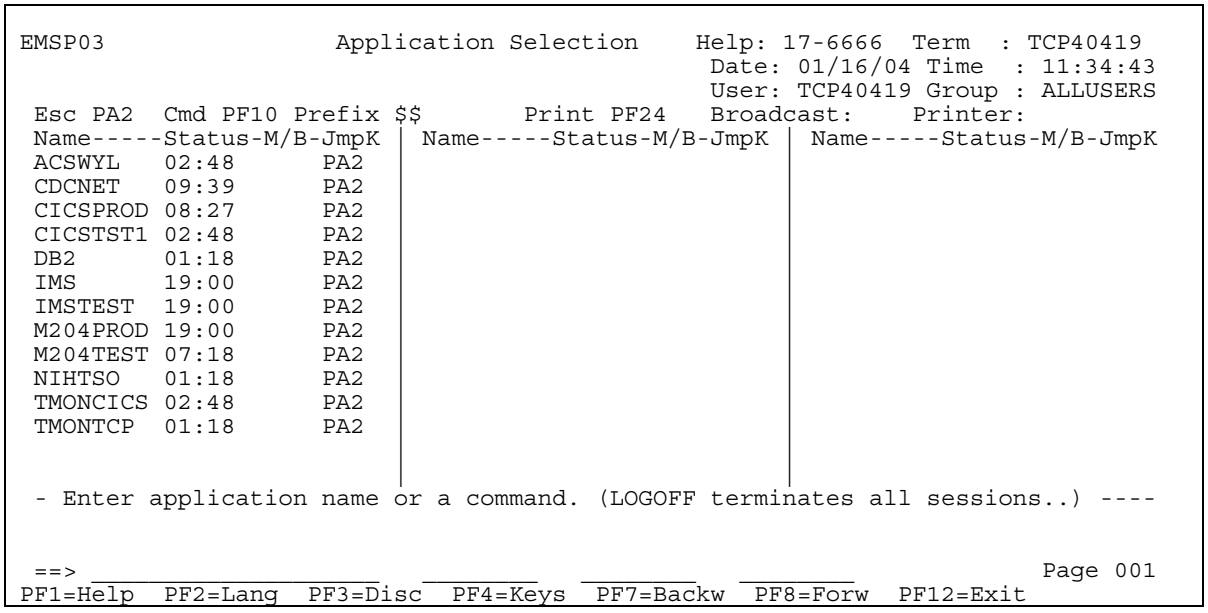
All telephone numbers are accessible through FTS.

* These 800/866 numbers should be used only by persons who do not have access to FTS2001.

** DB2 Access:

- To access the DB2 DSNP subsystem, enter "DB2" in the first field, your USERid in the second field, and "DBPROD" in the third field.
- To access other DB2 subsystems, go to http://silk.nih.gov/dbtek/db2doc and select "3270" under "Connectivity" for details.

After you connect to Titan, the Application Selection (NetView Access) menu appears. Select NIHTSO to access most Titan services. See Section 7.2.1 for additional access information under NIHTSO.



6.2 INTERACTIVE ACCESS

Network facilities provide communication between users and remote computer facilities, including accessing the online systems. Users with NIHnet or Internet (TCP/IP) connections are encouraged to use network access, whenever possible, to access the enterprise systems of the NIH Computer Center. Network file transfer is discussed in detail in Section 6.4.

NIHnet is the NIH backbone network that interconnects the Institutes and Centers (ICs), local area networks (LANs), and the NIH Computer Center with the Internet, Internet2, HHS operating divisions, and other government agencies. It controls access between the ICs and between NIH and the outside world. Information carried by NIHnet includes biomedical, clinical, and administrative data. NIHnet is a wide area network (WAN) comprised of a physical infrastructure of cable, optical fiber, routers and switches; network management control systems, servers, and workstations. This infrastructure supports the NIHnet operation; wireless access points; and security control systems, which include firewalls, intrusion detection systems (IDS), content filtering systems, and virus detectors. For more information on NIHnet, see Section 6.5.1.

LAN users experiencing problems should first contact their technical LAN coordinator. See Section 5.2.3 for more information on the role of the technical LAN coordinator.

Dialup connections to NIHnet are available using Parachute (PPP & Apple Remote Access Control High-speed User Telecommuting Engine), a CIT-supported product. See Section 6.2.5 for more information.

Domain Name Servers

In TCP/IP-based networking, the name server is the networked computer that translates Internet names, such as tn3270.titan.nih.gov, into the Internet Protocol Address (Internet number or IP number) necessary to make the connection. All connections to CIT TCP/IP-based services should be done through the Internet names, since the numerical IP addresses are subject to change. For example, if a user on the network wants to open a file transfer (FTP) session using FTP to Titan, the person would FTP to FTP.TITAN.NIH.GOV. The name server then translates that address into the Internet number for the actual FTP session.

NIH users can register a host name, set up an alias, perform DNS lookups, assign additional IP addresses, and perform other basic DNS changes themselves through the Web. Go to:

http://www.net.nih.gov/dns

TCP/IP users at NIH should configure the network options on their desktop workstations to use the name servers in the following order:

	IP Address	Name Server
1	128.231.128.251	ns.nih.gov
2	128.231.64.1	ns2.nih.gov
3	130.14.35.128	lhc.nlm.nih.gov

By having backups for the name servers, TCP/IP network users at NIH can be assured of the most reliable service possible.

6.2.1 Titan Telnet Servers

All access to CIT services via TCP/IP should be performed using host names (not the numerical IP addresses). See Section 6.1 for the Internet host names for TCP/IP access to online services. The domain name servers at NIH handle the name-to-address conversion for TCP/IP connections. See Section 6.2 for information on domain name servers.

Since you need a full-screen (3270) connection to access all Titan mainframe services, you must have TN3270 client software installed on your workstation. (See Section 6.2.2.) All system and user-written applications that run under TSO can be reached with TN3270 access. See Section 6.1 for the Titan host name.

Users with Internet connections running TCP/IP software on their workstations can access other computers that are connected to the Internet (such as the NIH Helix Systems). The telnet facilities of TCP/IP allow users to access other Internet computer sites interactively.

The NIH Computer Center supports TCP/IP access to the enterprise systems from Windows-based personal computers and Macintosh personal computers. For additional information, refer to the manual *Network Access to the Titan System,* available from the CIT publication service. See Section 5.4.

6.2.2 Client Products for TCP/IP Services

In order to access TCP/IP services on a NIHnet-connected workstation, users must install a compatible communications software package on the workstation itself. High-speed file transfer, remote job submission, and 3270 (full-screen) are some of the powerful capabilities currently available using this protocol. While Windows 95, Windows 98, Windows 2000, Windows NT, and Windows XP include TCP/IP driver software. NIH Macintosh users should see Section 6.2.3.

QWS3270 PLUS for TN3270 Connections

The NIH Computer Center has a site license for QWS3270 PLUS, the commercial version of QWS3270, which provides 3270 (full-screen) terminal emulation for workstations running 32-bit Windows (Windows 9x, or Windows NT/2000/XP). QWS3270 PLUS is fully

compatible with the NIH Computer Center's Titan system. This 3270 client software for network connections is available without charge. The software includes instructions on how to set up additional 3270 sessions.

Titan users can download QWS3270 PLUS from the Web by pointing their browsers to:

http://isdp.cit.nih.gov

Go to Downloads (under Software) and select TCP Tools. Choose Logon to Titan. Titan users must enter their USERid and RACF password. Other NIH staff with NIH IP addresses can also download QWS3270 PLUS.

Titan users can also download this software by going to:

http://titan.nih.gov

and selecting NIH Connectivity Tools.

Contact the TASC help desk if you need assistance.

QWS3270 Secure for TN3270 Connections

CIT provides QWS3270 Secure, a 3270 (full-screen) terminal emulation package that supports Secure Sockets Layer (SSL). QWS3270 Secure allows PCs to connect to SSL-enabled IBM mainframes over a secure TCP/IP connection that is fully compatible with Titan.

QWS3270 Secure, which runs on 32-bit Windows (Windows 9x, or Windows NT/2000/XP), is available without charge. Titan users can download QWS3270 Secure from the Web by pointing their browsers to:

http://isdp.cit.nih.gov

Go to Downloads (under Software) and select TCP Tools. Choose Logon to Titan. You must enter your Titan USERid and RACF password.

Titan users can also download this software by going to:

http://titan.nih.gov

and selecting NIH Connectivity Tools.

Because of the special secure port considerations, be sure to print and read the installation and configuration instructions before you install this product. QWS3270 Secure instructions also contain separate configuration directions for IMS/ADB users to allow them to connect directly to IMS. See Section 7.3.3 for more information. Contact the TASC help desk if you need assistance.

6.2.3 Network Connectivity for the Macintosh

In order to use a networking application, such as TN3270 or TN3270X, the Mac operating system must have the necessary complement of network components. Contact the TASC help desk for additional information.

A unique IP (Internet) address (number) is needed to configure Open Transport on each individual Macintosh on the network that will be using various protocols. A user can generally acquire the unique IP number by selecting "DHCP Server" in their network setup. An invalid or non-unique IP number can cause problems for the user and for other workstations on the network.

6.2.3.1 TN3270 or TN3270X for the Macintosh

TN3270 or TN3270X allows a Macintosh user, on a LAN connected to NIHnet, to access full-screen services, such as TSO, DB2, and ISPF. This software is available from PUBnet, the collection of network services available through NIHnet. PUBnet, which is maintained by CIT, is available through the Web at:

http://pubnet.nih.gov

Go to Mac Software/Internet Tools/Telnet Programs or Titan/TN3270 for applicable programs.

6.2.4 LAN SNA Gateways

Workstations and PCs on a LAN equipped with an SNA gateway can effect SNA 3270-type connections equivalent to connections traditionally achieved via 3270 terminals connected to a cluster controller. The LAN SNA gateway is connected via a telecommunication line (usually a 9600 bps leased line) to the NIH Computer Center. Users connected to the LAN communicate with the gateway using a LAN-based communications protocol. The gateway then converts the information coming in from the workstation to SNA/SDLC and, acting as a cluster controller, sends that information over the line to the mainframe. A single communication line connects the LAN and the NIH Computer Center, eliminating the need for individual dialup modems for each workstation.

CIT strongly recommends the use of TN3270 rather than LAN SNA gateways to access Titan. (See Section 6.2.1.)

CIT no longer accepts applications for new SNA circuits.

6.2.5 Parachute for Dialup Access

Dialup access to NIHnet is available through Parachute, a service sponsored by CIT. Parachute (PPP & Apple Remote Access Central Highspeed User Telecommuting Engine) allows users to connect remotely, using a modem and a phone line or an ISDN digital phone line, to a central server on the NIH wide-area network (NIHnet). Using Parachute, NIHnet and Internet services such as the Central Email Service, Titan, Helix services, and the Web can be accessed at modem speeds using high-speed remote technologies.

To connect to Titan through Parachute access to the NIHnet, you will also need a 3270 (full-screen) terminal emulation software package, such as QWS3270 PLUS installed on your workstation. For information on QWS3270 PLUS, which is supported by CIT, see Section 6.2.2.

Access Numbers

See Section 6.1 for the Parachute access telephone numbers. Please use one of the first pair of numbers (depending on whether you are dialing locally or long distance). If that number is busy, use one of the second pair of numbers.

How to Apply for Parachute

To apply for Parachute service a customer must:

- be registered to a CIT account. (If you do not currently have an account—or if you are uncertain whether you have an account or who your account sponsor is—contact the TASC help desk.)
- be an NIH employee or contractor
- have a valid business reason for needing this service
- receive approval from the account sponsor. The sponsor can request Parachute service for a user via Web Sponsor (see Section 2.3).

For More Information

For more information about Parachute and other remote access technologies, go to:

http://remoteaccess.nih.gov

For further information, send e-mail to tasc@nih.gov, or call the TASC help desk.

6.2.6 Other Interactive Access

If you are having problems using TN3270 to access Titan, contact the TASC help desk. The consultants will arrange to have a telecommunications specialist contact you. CIT highly recommends using the TN3270 feature of NIHnet for high-speed network access to 3270-based applications (see Section 6.2.2).

6.3 TELECOMMUNICATIONS FOR PRINTING OR JOB SUBMISSION

The NIH Computer Center supports both dialup and leased line service for high-speed remote job entry (RJE) telecommunications for printing or job submission. When dialup service is selected, the user must provide the modem at the RJE workstation.

> CIT plans to phase out support for RJE connections. New requests for RJE telecommunications connections are no longer accepted. We encourage users to access Titan through network connections. Contact the TASC help desk for assistance and to deregister from RJE service.

Access via RJE Emulation and RJE Workstation

Users can access Titan through high-speed RJE workstations under the control of JES2. Personal computers with RJE emulation software and necessary hardware can also establish a dial connection and operate as a RJE workstation. After establishing a dial connection:

- Enter the communications mode.
- Transmit a JES2 sign-on control statement.

The system should immediately respond.

There is an automatic disconnect after a terminal has remained idle (i.e., no data transmitted in either direction) for the following periods of time:

- **Dialup RJE station:** 20 minutes
- **Leased-line RJE station:** 60 minutes

To resume processing after an automatic disconnect has occurred, it will be necessary for the station to reconnect through normal sign-on procedure.

An alternative to the use of RJE terminals for printing output is the VPS printing service (see Section 6.5.4).

For More Information

For additional information on remote job submission, see Section 11.2 and the *Titan Batch Processing* manual.

6.4 FILE TRANSFER AND DATA EXCHANGE

This section describes various methods of transferring data between desktop computers and the mainframe and between NIH and other computer centers.

6.4.1 File Transfer Using FTP

A user can transfer files between a workstation connected to the Internet, or on a NIHnet-connected LAN running TCP/IP software, and the Titan system. The FTP facilities of TCP/IP provide high-speed file transfer between a user's workstation and the other Internet site. For FTP access, connect to FTP.TITAN.NIH.GOV, the host name of the FTP server on Titan.

Users with a TCP/IP connection to the Internet can transfer files in either direction (i.e., to the mainframe, or from the mainframe to their workstations). Unix workstations can also transfer files to and from Titan using appropriate FTP software packages.

To transmit a batch job to Titan, use the FTP command SITE FILETYPE=JES. For additional information, refer to the manual *Network Access to the Titan System*, available from the CIT publication service. See Section 5.4.

Contact the TASC help desk for recommendations on client products for TCP/IP-based file transfer.

WS_FTP Pro

CIT provides WS_FTP Pro to its users. WS_FTP Pro, a software package based on the file transfer protocol (FTP), provides fast and accurate transfer of files or collections of files between Internet-connected computers using Windows 98/2000/NT/XP.

The installation program installs two interfaces—Classic and Explorer. If you connect to Titan, use the Classic interface (the icon labeled WS_FTP Pro). This interface provides the best display of file names and allows you to use the QUOTE and SITE commands.

For security reasons, we recommend that you don't allow WS_FTP Pro to encrypt and store your password in its .ini file.

WS_FTP Pro software can be downloaded from the Web. Go to:

http://isdp.cit.nih.gov

Choose Downloads (under Software) and then select TCP Tools. Titan users must enter their USERid and RACF password. Other NIH staff with NIH IP addresses can also download WS_FTP Pro.

Electronic documentation is included with the software, under the help menu.

Titan users can also download this software by going to:

http://titan.nih.gov

and selecting NIH Connectivity Tools.

If you need additional assistance, contact the TASC help desk.

6.4.2 Parachute

Parachute allows authorized users to log on to NIHnet and to e-mail from off-campus using a high-speed modem and a standard telephone line. Once you have established the modem connection to the network via Parachute, you can use an FTP software package to transfer files to and from your workstation. For additional information on Parachute, see Section 6.2.5.

6.4.3 Network Job Entry (NJE)

The NIH Computer Center, in cooperation with other data processing centers, provides a capability whereby a batch job can execute at one data center and output can be printed at another. This facility is easy to use and does not require significant JCL changes to implement. NJE (Network Job Entry) files can be transferred between the NIH Computer Center and other computer centers using host-to-host file transfer. CIT supports batch programs to perform this type of file transfer—SENDFILE /RCVFILE and CONNECT:Direct (see Section 6.4.4). For further information, refer to the manual *Titan Batch Processing*.

Pre-registration for Printing Non-NIH NJE Jobs

The NIH Computer Center requires users who execute jobs outside of NIH and then transmit them to Titan for printing to pre-register with the TASC help desk. This information will allow CIT to charge the appropriate account for printing and provide contact information in case of problems.

Contact the TASC help desk and provide the following information:

- the originating node name (i.e., where the job will be coming from)
- the userid at the originating node
- one or more associated valid Titan USERids

For example:

Information Needed	**Examples**
Non-NIH NJE node name	CDCJES2, SSAPRD1, HCFJES, CCF1, NPH, HCFJES, CCF1, NPH, SPGFLD
userid registered at the non-NIH node	JOHND
Associated Titan USERid(s)	aaaaiii, $iii

6.4.4 CONNECT:Direct

CONNECT:Direct, a product that provides host-to-host file transfer, is required by the Department of the Treasury for online financial transactions with their systems. The function it provides is similar to that of the SENDFILE and RCVFILE programs (described in the manual *Titan Batch Processing*) but it is easier to use. CONNECT:Direct monitors the progress of the file transfer.

CONNECT:Direct must be installed at the remote site as well as at NIH, and requires either a VTAM or TCP/IP connection between the two sites. CONNECT:Direct is controlled by a process that is similar to a JCL procedure. Once the process is written, the user needs only to supply the values for various parameters. The two parameters used most are the source data set name and the target data set name.

CONNECT:Direct requires coordination with another site as well as modifications to certain CONNECT:Direct configuration files. To register to use CONNECT:Direct, submit a CIT Service Request that includes the following information:

- the destination of the data to be transmitted
- the nature of the data to be transmitted
- the amount and frequency of the transmitted data

Each project must have a Data Transmission Administrator (DTA) who is responsible for setting up and maintaining the jobs and CONNECT:Direct processes needed to transmit the data. All correspondence with CIT regarding a registered CONNECT:Direct project should specify the name of the DTA.

If users on other systems will be transferring files to Titan via CONNECT:Direct, the DTA must obtain a restrictive Titan USERid for each such user. This USERid will have the following special characteristics:

- logon to NIH systems will not be permitted
- the associated password will not expire

Users from other systems must add the following CONNECT:Direct parameter to the appropriate CONNECT:Direct control statements:

```
SNODEID=(userid,password)
```

The DTA must arrange to have an appropriate RACF profile set up for this restricted USERid. The DTA should contact the security coordinator for the account.

For additional information, refer to *Titan Batch Processing* or

http://silk.nih.gov/public/PUBLIC.@WWW.TITAN.TITAN.DATA.TRANSFER.HTML

6.4.5 IND$FILE for 3270 File Transfer

Many PC 3270 emulation packages support file transfer between the host and the PC if an IBM program named IND$FILE is installed on the host. IND$FILE provides the mainframe side of a file transfer capability from 3270-type terminals (or workstations emulating them). IND$FILE has been successfully tested with such packages as QWS3270 PLUS, the IBM PC 3270 Emulation Program, EXTRA by Attachmate, and IRMAremote for Hayes AutoSync by DCA. For information on QWS3270 PLUS, see Section 6.2.2.

The use of IND$FILE for 3270 file transfer requires specific software on the PC. Because the use of IND$FILE in most 3270 emulation packages is transparent to the user, it is not necessary to know how to use it, only that it is available. Perform the file transfer from the TSO ready prompt or from the command option of the CIT/Titan Primary Option Panel.

6.4.6 Exchanging Tapes with Other Installations

Tape is the preferred medium for transporting large data files from one installation to another because RAMAC (logical 3390) disks cannot be transferred. Whether exporting or importing data, be sure that the receiving installation has the type of drive capable of processing the tape, especially cartridge tapes.

Tapes in the Virtual Storage Manager (VSM) may not be removed from the NIH Computer Center. See Section 10.2 and Section 10.2.5.

6.5 NETWORK SERVICES

Network connectivity is an essential tool for the biomedical, clinical, and administrative communities at NIH, other government agencies, and organizations worldwide. NIHnet is the NIH backbone network that interconnects the Institutes and Centers (ICs), local area networks (LANs), and the NIH Computer Center with the Internet, Internet2, HHS operating divisions, and other government agencies. It controls access between the ICs and between NIH and the outside world. Information carried by NIHnet includes biomedical, clinical, and administrative data. NIHnet is a wide area network (WAN) comprised of a physical infrastructure of cable, optical fiber, routers and switches; network management control systems, servers, and workstations. This infrastructure supports the NIHnet operation; wireless access points; and security control systems, which include firewalls, intrusion detection systems (IDS), content filtering systems, and virus detectors.

See Section 6.1 for the Internet host names for NIHnet access to the central systems. Section 6.2 contains the Internet Numbers (numerical IP addresses) for the NIH domain name servers. These numbers are required for configuring network software packages.

CIT supports Parachute, a service that offers high-speed dialup connectivity to access NIHnet. See Section 6.2.5 for more information on Parachute.

6.5.1 NIHNET CONNECTIVITY

A NIHnet connection provides reliable, high-speed access to a wide variety of network services. The NIH Computer Center supports network services that allow Titan users, with a NIHnet connection from their desktop computers, to:

- perform high-speed file transfers (FTP) (see Section 6.4)
- submit batch jobs (see the manual *Network Access to the Titan System*)
- take advantage of client/server database management systems (see Section 7.3.4)
- send e-mail worldwide (see Section 7.9)
- transmit Titan output to a local network printer (6.5.4)
- initiate full-screen sessions (via TN3270) to Titan (see Section 6.1)
- back up data on desktop computers to Titan using the NIH Backup and Recovery Service (NBARS). See Section 10.3 for information.

The topology of the NIHnet backbone uses redundant connections and equipment locations to provide more resilience and resistance to outage. To ensure sufficient capacity for data requirements, the NIHnet has a high-speed primary connection to the Internet. A portion of NIHnet resides in the machine room of building 12.

Technical LAN Coordinators

For every LAN connected to NIHnet there is a technical LAN coordinator (TLC). Users on a LAN connected to NIHnet who have connectivity problems should first contact their TLC for assistance. The TLC works with CIT in the event of a networking or connectivity problem between a LAN and its NIHnet connection. For additional information on technical LAN coordinators, see Section 5.2.3.

Popular CIT NIHnet Services

CIT organizations support a variety of NIHnet-based services including:

- Central Email Service (CES) —provides e-mail services for the NIH community. The CES provides e-mail, scheduling, and other messaging services to the NIH. NIH users are encouraged to take advantage of this service. There is no direct charge for this service to NIH ICs. More information can be found at http://www.mail.nih.gov.
- Central Fax Service—provides electronic fax capability to e-mail users at NIH. Visit: http://www.fax.nih.gov.
- Domain Name Service—domain name servers (DNS) are networked computers that translate Internet names, such as TN3270.TITAN.NIH.GOV, into the IP addresses necessary to make the connection. NIH users can register host names and make other DNS changes via the Web. See Section 6.2 for more information.
- High-Speed Remote Access Solutions—high-speed access to NIHnet via a variety of connection technologies (http://remoteaccess.nih.gov)
- iSDP—(Information Systems Designated Procurement) acquires and delivers brand-name software, hardware and services to NIH and HHS personnel (http://isdp.cit.nih.gov).

- Listserv facility—supports online groups via e-mail and the Web. See Figure 6-2.
- NetNews Service—news.nih.gov is available to all NIH users for reading and posting Usenet news. To access newsgroups, you need news reader software.
- NIH Backup and Recovery Service (NBARS) —allows NIHnet-connected users to back up and recover data stored on LAN servers and desktop computers. See Section 10.3.
- NIH Directory and E-mail Forwarding Service—e-mail directory for NIH (http://directory.nih.gov).
- NIHnet IP Multicast services—videocasting to the desktop (http://videocast.nih.gov).
- Parachute (PPP & Apple Remote Access Central Highspeed User Telecommuting Engine) —a service supported by CIT that offers high-speed dialup connectivity to access NIHnet. See Section 6.2.5 for more information on Parachute.
- PrintShare—a service developed and supported by CIT that allows networked PC, Unix, and mainframe users to print to the nearest networked AppleTalk printer. See http://www.net.nih.gov/printshr.htm.
- PUBnet— a collection of network services available via the NIHnet. PUBnet provides software distribution (freeware, shareware) for MacOS users, security/virus information for Macintosh platforms, and NIH-approved electronic forms available for download (http://pubnet.nih.gov).
- Windows Internet Name Service (WINS—provides a way to get NetBIOS name lookup for Windows computers on a network.

The variety of NIHnet-based services reflects the heterogeneous nature of the NIH environment and of the Internet as well. Despite their variety, however, these network services have one thing in common: NIHnet is the conduit by which they are delivered to users at NIH. (In addition, most are also TCP/IP-based.)

For More Information
For more information on specific NIHnet-supported services, contact the TASC help desk or go to:

http://cit.nih.gov

and select NIHnet.

6.5.2 Internet

Each member of the Internet is assigned a unique host name. See Section 6.2 for the Internet host names used by the NIH Computer Center. The Internet is a worldwide system of computer networks that allows computers from one network to connect to resources on other networks. The most widely used features of the Internet are the World Wide Web and electronic mail. NIHnet maintains physically and logically diverse connections to the Internet in order to ensure high availability.

World Wide Web

One of the most popular services of the Internet is the Web, which provides access to a multimedia collection (text, images, video, and sound) of hyper-linked documents. Users need a TCP/IP connection and browser software (such as Netscape Navigator or Microsoft Internet Explorer) on their workstations to access the Web. Users on the Helix System can also access the Web through Lynx, a non-graphical Web browser. A Uniform Resource Locator (URL) describes where an Internet object, such as a document or a "Home page," is located and what protocol is needed to access it.

Many CIT and NIH Computer Center facilities take advantage of the Web. The Web will serve as the "front end" to more and more applications in the future. All users of the NIH Computer Center should have browser software on their desktop computers in order to: download software, learn the identity of their TLCs, read documentation (including *Interface*), order manuals, look up an e-mail address, register for a training course, submit a CIT Service Request, use RACF, change account information (for account sponsors), and learn about-or take advantage of many other CIT services.

SILK (Secure Internet LinKed) Web technologies, supported by the NIH Computer Center, allow users to access data stored on Titan and use many CIT enterprise applications. For information on SILK see Section 7.5 or visit:

http://titan.nih.gov

See Figure 6-2 for a directory of helpful Web sites.

Figure 6-2. World Wide Web Service Directory

Service	Web Address
National Institutes of Health	http://www.nih.gov
NIH Business and Research Support System	http://nbrss.nih.gov
NIH Data Warehouse	http://datatown.nih.gov
NIH Electronic Directory	http://ned.nih.gov
NIH Help Desk	http://support.nih.gov
NIH nVision	https://my.nih.gov
NIH Portal	https://my.nih.gov
Antivirus Web site	http://antivirus.nih.gov
Information Systems Designated Procurement	http://isdp.cit.nih.gov
Center for Information Technology	http://cit.nih.gov
Computational Bioscience Center for Molecular Modeling	http://cmm.info.nih.gov/modeling
NIH Computer Center	http://datacenter.cit.nih.gov
Scientific Computing	
ALW	http://www.alw.nih.gov
Helix	http://helix.nih.gov
NIH Biowulf Cluster	http://biowulf.nih.gov
Enterprise Computing	
OS/390 (Titan)	http://datacenter.cit.nih.gov/mvs
Transition Update	http://silk.nih.gov/silk/titan
Titan News	http://datacenter.cit.nih.gov/titannews
RACF	http://titan.nih.gov/racf
SILK Web	http://titan.nih.gov
Web Sponsor	http://websponsor.cit.nih.gov
Unix (EOS)	http://datacenter.cit.nih.gov/eos
Windows Server Services	http://wintelhosting.cit.nih.gov
Application Service Request (ASR)	http://hosting.cit.nih.gov/asr/log.cfm
ColdFusion	http://cfhosting.cit.nih.gov
Database Technologies	http://silk.nih.gov/dbtech
Interface	http://datacenter.cit.nih.gov/interface
NIH Backup and Recovery Service (NBARS)	http://silk.nih.gov/silk/nbars
Oracle Hosting Services	http://silk.nih.gov/silk/citoracle
Customer Services	
Accounts	http://support.cit.nih.gov/accounts
Customer Support	http://support.cit.nih.gov

Service	Web Address
Publications	http://publications.cit.nih.gov
Service Request	http://support.cit.nih.gov
TASC Help Desk	http://support.cit.nih.gov
Training	http://training.cit.nih.gov
Network Services	
Listserv	http://list.nih.gov
NIHnet	http://www.cit.nih.gov/dnst/DNSTweb/handbook.html
Remote Access (including Parachute)	http://remoteaccess.nih.gov

6.5.3 Internet2 and Abilene

Internet2 is a consortium led by over 200 universities in partnership with industry and government to develop and deploy advanced network applications and technologies. The Abilene network, created by Internet2, is a high performance backbone network that interconnects the NIHnet with universities and research centers at speeds which exceed the capability of the Internet.

6.5.4 VPS Printing Service

The VPS printing service supports mainframe-to-network printing from the mainframe to printers accessible via NIHnet or the Internet. Printed output from Titan can be produced on printers attached to a PC, Mac, workstation, or local area network (LAN) connected to NIHnet and running an LPD server. AppleTalk printers are supported in conjunction with the PrintShare services provided by CIT (see below).

Local printers (print queues) that have not been used for 12 months will be flagged for removal from the table of queue names and for reissue to another user. Contact the TASC help desk if there are any questions concerning this policy.

VPS converts mainframe print output into a TCP/IP print request conforming to the Berkeley Line Print Daemon (LPR/LPD) standard. This LPR print request is then sent from Titan to the appropriate networked LPD server. Many users can share a printer, or one printer can be used exclusively by a single user.

The LPD server must be configured locally and registered with CIT prior to being used by VPS. Users are responsible for setting up the local LPD server. An IBM PC-compatible environment requires Windows NT/2000/XP. Almost any Unix LPD server can be used.

CIT will assist administrators in modifying configurations for VPS printing from Titan. Firewalls must be properly configured to permit VPS to deliver print requests from the Titan system to LAN printers.

Additional Information
For additional information and to register your printer for VPS, go to:

http://silk.nih.gov/silk/vps

Macintosh Printing Using PrintShare
PrintShare, a NIHnet service developed and supported by CIT, allows networked PC, Mac, Unix, and mainframe users to print to the nearest networked AppleTalk printer. PrintShare can be used with VPS to send mainframe print jobs directly to a networked AppleTalk printer. For further information, or to register an AppleTalk printer for PrintShare, call the TASC help desk or visit:

http://silk.nih.gov/silk/vps

7 SYSTEMS AND APPLICATIONS SOFTWARE

A wide range of major systems and development facilities are available on Titan for its users. These include interactive systems, database systems, client/server products, Web facilities, and programming languages. See Figure 5-1 for a list of supported software facilities.

7.1 OPERATING SYSTEMS

An operating system is a library of programs that controls resource allocation and program execution. These programs can be tailored to meet the individual requirements of a computer installation. The NIH Computer Center offers application hosting services on the mainframe (Titan), Unix (EOS), and Windows computing platforms.

7.1.1 Titan Operating System

> The NIH Computer plans to upgrade the operating system to z/OS during the summer of 2004.

The systems software serving the Titan facility is composed of the IBM OS/390 operating system with job control language (JCL) and the Job Entry Subsystem Version 2 (JES2) as the user interface. For more information on job control language, refer to the *Titan Batch Processing* manual. See Section 5.4 for information on ordering documentation.

The operating system vastly expands the address space that can be available to each task and uses the computer's memory more efficiently than non-virtual systems. This is possible since only the active portions of programs are kept in real memory. JES2 acts as the batch job scheduler and controller for the operating system. OS/390 allows the creation of multiple, data-only address spaces (called "data spaces") of up to 2 billion bytes of virtual storage. OS/390 substantially enhances the reliability, availability, and serviceability characteristics of the operating system.

This complex operating system presents a unified system interface to the user. Shared files and work queues make it possible to balance the workloads of the various subsystems and to permit service to resume promptly even if one machine is out of service for an extended period of time. This is done by switching the services usually provided by the failing machine to the others.

The operating system is a standardized environment that offers users flexibility in the establishment and utilization of TSO sessions. Language environment (LE) is an architectural interface designed to meet IEEE's portable operating system interface (POSIX) standards. By meeting these POSIX standards for code and user interfaces, LE-conforming programs can cross operating systems, platforms, and environments. The LE interface provides application programs with a common run-time service and run-time environment—that is, a set of

resources and modules that support the execution of an application program. LE establishes a common run-time environment for all participating high-level languages (HLL).

7.1.1.1 Cross-System Enqueue

The cross-system enqueue software in use at the NIH Computer Center is MIM (Multi-Image Manager) from Computer Associates. It provides automatic data set integrity protection in a multi-processor environment, preventing accidental destruction of data from jobs or interactive sessions modifying any data set with the same name at the same time.

ThruPut Manager interfaces with MIM to determine which data sets are needed and the type of control (shared or exclusive) required for each data set. If a needed data set is not available, the jobs are requeued and placed in a special TM HOLD for jobs experiencing dataset contention. ThruPut Manager monitors the availability of data sets on behalf of the job to determine when the job should be released from the TM HOLD queue. Once the data sets in question are available, ThruPut Manager allows the TM HOLD job to be initiated. This technique eliminates tying up system resources and degrading system throughput. In addition, jobs will no longer be cancelled due to data set contention. For more information on ThruPut Manager see the *Titan Batch Processing* manual.

7.1.1.2 Software Features Not Permitted at NIH

System libraries and software modules will not be updated or changed to accommodate user software. Also, user software is not permitted to use any means (e.g., CALL, ATTACH, LINK) to invoke compilers, system modules, or the Program Management Binder unless Computer Center documentation specifically permits such access. These restrictions are necessary to preserve the integrity and dependability of the operating system.

The following facilities incorporated in the mainframe operating system cannot be used at the NIH Computer Center because they are not supported or their use may cause performance problems:

Checkpoint/Restart
MVS Password Protection
Absolute Track Allocation
Reserve/Release Macros
WTO/WTOR Macros
APF Facilities[7]
SSCT7[7]
Special SVCs
Special SMF Exits

[7] Contact the NIH Computer Center through TASC concerning the use of these facilities.

RACF ERASE option of ADDSD and ALTDSD
ERASE option of any AMS command
SUPER ZAP[7]

No list of exceptions can be complete. The *Titan Batch Processing* manual documents the software facilities to be used at the NIH Computer Center. Occasionally a user will discover a non-supported feature in a Computer Center supported product that works or appears to work, and will integrate it into an application. Such a user runs the risk that the non-supported feature will suddenly not work at all, or worse yet will appear to work but will actually produce erroneous results.

Before using a facility not mentioned in Computer Center documentation, submit a CIT Service Request (see Section 5.2.2) to make certain it is allowed. In many cases an alternative technique is supported.

Other Restrictions

- The creation of unmovable data sets on disk is not permitted.
- It is forbidden to have software send information about the application to the machine room operator's console.
- Under no circumstances should a user access system data sets (e.g., system libraries, disk VTOCs) with any software other than that supplied by the NIH Computer Center and described in CIT documentation. Formal action will be taken against anyone who attempts to circumvent protection software and threatens the security of accounts or data.
- It is against Computer Center policy to permit use of the system as a recreational facility; CIT will take immediate action against anyone found using its resources to play computer games, even in learning situations. For further details on restrictions against use of computers for personal and recreational use, see Section 1.5.
- Because the printed output format of Computer Center utilities is subject to change without notice, software should not be designed to depend on such output. For information, refer to the manual *Titan Batch Processing*.
- Certain job control language features cannot be used at this computer center. Refer to the *Titan Batch Processing* manual.

7.1.2 Open Systems

The open systems components of the NIH Computer Center enterprise systems include EOS, a Unix-based computing environment, and the Unix System Services (USS) subsystem of the mainframe operating system.

7.1.2.1 Unix (Tru64 UNIX)

The NIH Computer Center hosts a variety of production and development applications on EOS. A variety of servers provide the base for the EOS environment for client/server (i.e., Unix-based) applications. For additional information, send e-mail to silkweb@list.nih.gov or visit:

http://datacenter.cit.nih.gov/eos

7.1.2.2 Unix System Services (USS)

The Unix System Services (USS) component of Titan offers significant enhancements in the open systems arena. USS includes the POSIX programming environment.

7.1.3 Windows Server Services

Windows-based applications can be hosted on CIT Intel-based servers that are maintained and monitored on a 7 x 24 basis. This facility provides a computing environment suitable for critical, enterprise-wide applications. For more information, visit:

http://wintelhosting.cit.nih.gov

7.2 INTERACTIVE SYSTEMS

The interactive systems prompt the user for input data and instructions, pass data and specifications to programs, and return output to the user's workstation. Use the Application Selection menu (see Section 6.1) to access Titan's interactive terminal systems.

7.2.1 TSO

TSO (Time Sharing Option) provides interactive access to the facilities of the computer system. Users can enter, retrieve, update, and store data; as well as create, test, and execute programs with the results available at a workstation. The following sections describe many of the subsystems and facilities that are installed to function under TSO. For additional information about TSO, refer to the TSO documentation available from CIT (see Section 5.4).

All data files to be accessed interactively must be mainframe data sets with standard data set names (See Section 10) and must be stored on disk. Tape data sets must be transferred to disk prior to processing.

Titan TSO sessions issue a warning message on the screen after every 30 CPU seconds of processing time to alert you that your TSO session may be looping. If you receive a warning:

- It will not cause your session to be automatically terminated. However, when you issue a TSO command or execute a program or CLIST, do not leave your system unattended.
- Determine if the amount of CPU time used is reasonable for the session. If the CPU time seems reasonable, ignore the message and keep an eye on the session. If the CPU time seems excessive, manually interrupt processing by pressing the key mapped to the ATTN, PA1, or PA2 key, as appropriate.

TSO/E LOGON Panel

Access the Application Selection menu using a network or dialup connection (see Section 6.1), and type NIHTSO at the cursor. Tab over, enter your USERid, and hit ENTER. Next, you will see the logon panel below:

```
------------------------------ TSO/E LOGON ---------------------------------

      Enter LOGON parameters below:                  RACF LOGON parameters:

      Userid    ===> $III  (or AAAAIII)

      Password  ===>                                 New Password ===>

      Procedure ===> MAIN                            Group Ident  ===>

      Acct Nmbr ===> AAA  (or AAAA)

      Size      ===> 4096

      Perform   ===>

      Command   ===>

      Enter an 'S' before each option desired below:
                -Nomail         -Nonotice        -Reconnect        -OIDcard

PF1/PF13 ==> Help    PF3/PF15 ==> Logoff    PA1 ==> Attention    PA2 ==> Reshow
You may request specific help information by entering a '?' in any entry field
```

Respond by entering your password.

Tips on This Panel

- To change your password—enter a password in the NEW PASSWORD field at any time.
- To change the "Procedure" from the default—change the procedure field by typing the existing one.

CIT/Titan Primary Option Menu

Upon completion of the logon screen you are immediately placed into the message screen, which contains pertinent RACF information and any messages from the broadcast system. Hit Enter to go to the CIT/Titan Primary Option Menu panel (ISPF Primary Option Panel). To eliminate the copyright panel in the lower left corner and see the full panel for this screen, hit Enter. You can enter the desired option in the option field and proceed into the selected panel. **Note:** the option line is at the bottom of the panel.

```
        Menu  Utilities  Compilers  Options  Status  Help
--------------------------------------------------------------------------------
                          CIT/Titan Primary Option Menu

 0   Settings      Terminal and user parameters          User ID . : $III
 1   View          Display source or listings            Time. . . : 10:56
 2   Edit          Create or change source data          Terminal. : 3278
 3   Utilities     Perform utility functions             Screen. . : 1
 4   Foreground    Interactive language processing       Language. : ENGLISH
 5   Batch         Submit job for language processing    Appl ID . : ISP
 6   Command       Enter TSO or Workstation commands     TSO logon : SYSPROC
 7   Dialog Test   Perform dialog testing                TSO prefix: $III
 IOF IOF           Job and SYSOUT                        System ID : SYS4
 MAX MAX           MAX (V view  E edit  M pdf)           MVS acct. : AAA
 C   Products      Additional Products                   Release . : ISPF 5.0
 L   Local         Local utilities/applications

      Enter X to Terminate using log/list defaults


 Option ===>
  F1=Help      F3=Exit     F10=Actions  F12=Cancel
```

Tips on This Panel

- To return the Option ===> to the top of the screen—change the default parameter in the Settings list. Place a zero in the option field and the following screen will appear:

```
Log/List  Function keys  Colors  Environ  Workstation  Identifier  Help
--------------------------------------------------------------------------------
                                 ISPF Settings
                                                                    More:    +
 Options                                    Print Graphics
   Enter "/" to select option                 Family printer type 2
   /  Command line at bottom                  Device name . . . .
   /  Panel display CUA mode                  Aspect ratio  . . . 0
   /  Long message in pop-up
   /  Tab to action bar choices
      Tab to point-and-shoot fields         General
   /  Restore TEST/TRACE options              Input field pad . . N
      Session Manager mode                    Command delimiter . ;
   /  Jump from leader dots
      Edit PRINTDS Command
   /  Always show split line
      Enable EURO sign


   Terminal Characteristics
   Screen format   1  1. Data    2. Std     3. Max     4. Part

   Terminal Type   3    1. 3277       2. 3277A      3. 3278       4. 3278A
 Command ===>
  F1=Help      F3=Exit     F10=Actions  F12=Cancel
```

Tips on This Panel

- To return the command line to the top of the screen, remove the / in the "Command line at the bottom" option (the default). Simply select the / and hit delete.
- The default setting places the cursor at the action bar. To change the default and place the cursor at the option field, remove the / from the "Tab to action bar choices" option.
- Hit F3 to exit the current panel.
- Having reset the options, your ISPF main menu will look like the one that follows for all future sessions.

```
         Menu  Utilities  Compilers  Options  Status  Help
--------------------------------------------------------------------------------
                              CIT/Titan Primary Option Menu
Option ===>

0   Settings      Terminal and user parameters          User ID . : $III
1   View          Display source or listings            Time. . . : 11:05
2   Edit          Create or change source data          Terminal. : 3278
3   Utilities     Perform utility functions             Screen. . : 1
4   Foreground    Interactive language processing       Language. : ENGLISH
5   Batch         Submit job for language processing    Appl ID . : ISP
6   Command       Enter TSO or Workstation commands     TSO logon : SYSPROC
7   Dialog Test   Perform dialog testing                TSO prefix: $III
IOF IOF           Job and SYSOUT                        System ID : SYS4
MAX MAX           MAX (V view  E edit  M pdf)           MVS acct. : AAA
C   Products      Additional Products                   Release . : ISPF 5.0
L   Local         Local utilities/applications


      Enter X to Terminate using log/list defaults



  F1=Help      F3=Exit     F10=Actions  F12=Cancel
```

PF Key Values

In the above panel display, F12 is set to cancel your session.

Review the PF key settings established by the software and reset them to meet your needs. Please note that the PF key settings are not necessarily consistent from panel to panel, therefore, it is a good idea to review the keys for panels you use with some frequency. Users who have customized PF keys to their own personal features will also have to reset them from the defaults established for Titan. The command keys should be entered at each panel to verify the default settings.

TSO Superset Utilities

Titan provides the TSO user with special utilities that can be used to perform frequently required functions. The commands include: COPY, MERGE, LIST, FORMAT, and LISTJES. SORT functions interactively and prompts the user for input, output, and sort statements if none are provided. The sort will make all allocations. LISTJES is an alternative to the TSO OUTPUT command; it provides scrolling commands for viewing the output.

Logging Off
When you log off of TSO, you will return to the Application Selection screen (See Section 6.1). At this point, just close the window—click the X in the top right corner.

Note—If you type LOGOFF or hit PF3 from the Application Selection screen you will see the "NetView Access Services" screen. You **cannot** do anything from this screen. To return to the Application Selection screen, hit PF12.

Web Access to TSO commands
Some TSO commands can be executed through the Web. Open your browser to:

http://titan.nih.gov/tsocmd

Select a command from the drop-down menu, and then type in the name of the job or the data set name.

This Web-based service is provided through SILK (Secure Internet LinKed) Web technologies. For information on other SILK Web services, see Section 7.5.

Canceling a TSO Session
If you have a frozen TSO session or a runaway CLIST, you can cancel your TSO session through the same Web facility that allows you to execute TSO commands and cancel jobs. A TSO session is really just a special type of job. First, you must identify the TSO session, then you can cancel the session. Open your browser to:

http://titan.nih.gov/tsocmd

Identify your TSO Session
- For the COMMAND option —select "status" from the drop-down menu
- For the Job or Data Set Name option —type your Titan USERid in the open field.
- Press "Enter" to Display Your TSO Jobs

You will be prompted for your Titan USERid and RACF password. A job or list of jobs will appear. For example:

JOB AAAAIII(TSU12443) ON OUTPUT QUEUE
JOB AAAAIII(TSU22801) ON OUTPUT QUEUE
JOB AAAAIII(TSU22843) EXECUTING

In this example, the third job on the list is the current TSO session—that is, the one marked EXECUTING. Make note of the job number, then click on the BACK button of your browser to return to the previous page. The first two jobs on the list above are older sessions.

Cancel Your TSO Session
- COMMAND—select "cancel" from the drop-down menu

- Job or Data Set—type in your Titan USERid. For example:

  AAAAIII(TSU22843)

  Note: If there are several TSO sessions in the list, you must include the job number when you cancel your session. (Hint: just copy and paste the USERid and job number from the list of jobs).

If you need assistance, contact the TASC help desk.

7.2.1.1 ISPF (Interactive System Productivity Facility)

ISPF, a software system available under TSO, extends the capabilities of TSO and provides increased performance. ISPF also includes interfaces to language processors, which can be invoked in the foreground, and extensive application testing facilities. ISPF consists of two major components, the Dialog Manager and the Program Development Facility.

Dialog Manager

The dialog manager (the application manager for ISPF) is used to develop formatted screens tailored to the user application. It can create applications using graphical user interfaces—including pop-up windows, action bars, and pull-down menus.

Program Development Facility (PDF), also known as SPF

The program development facilities can create or access a partitioned or sequential data set. In addition to program source statements and JCL, the data sets may consist of input data or text for any kind of processing or formatting program. The program development component includes:

- full-screen editing commands
- forward, backward, and lateral scrolling
- an interface to data utilities for library, file, and data set maintenance
- foreground and background execution of language processors
- a facility for submitting batch jobs to JES2 for background processing
- an online tutorial
- split screen capabilities that permit the user to alternate between two functions as though two terminals were in use

Two additional products provide enhancements to ISPF:

- MVS/QuickRef, a "pop-up" quick reference tool (see Section 7.2.1.3)
- MAX, a collection of data and file manipulation programmer tools (see Section 7.2.1.2)

ISPF Logon and Logoff Procedures
To use ISPF, log on to TSO. (See Section 6.1 for the proper terminal and system selection procedures.) The system will automatically bring up the CIT/Titan Primary Option Menu. This is also the primary option menu for ISPF. To exit ISPF and get to the TSO READY prompt, type **X** at the command line.

ISPF Edit
ISPF provides a complete range of full-screen editing facilities including:

- scrolling forward, backward, or sideways through a data set and use of the cursor to add, change, or delete characters anywhere on the display screen
- inserting, changing, or deleting lines anywhere in the data set, duplicating lines, and copying or moving lines from one place to another
- creating new data sets by entering new data or copying data from other data sets
- performing frequently used operations by use of Program Function (PF) Keys

ISPF Utilities
ISPF utilities are a group of full-screen, interactive commands that provide a variety of functions commonly required for effective processing. These commands are initiated and controlled during an ISPF session through easy-to-use menu selection panels. The major functions are:

- maintaining libraries, data sets, and catalogs
- moving and copying data
- resetting ISPF library statistics
- initiating hardcopy output
- displaying or printing VTOC entries for a disk volume
- browsing through and printing held SYSOUT data

For More Information
To learn more about ISPF facilities, try using the interactive tutorial. From the CIT/Titan Primary Option menu, select Help from the Action Bar on the top of the panel, and then choose Tutorial. CIT offers documentation on ISPF through the Web. See Section 5.4 for more information.

7.2.1.2 MAX

MAX is a collection of data and file manipulation programmer tools for use under ISPF. MAX has the ability to browse and edit VSAM data sets and sequential data sets online. It permits formatted browsing and editing using COBOL copybooks. MAX also helps users allocate or delete VSAM files. It eliminates ISPF's record length and file size restrictions. Other features include enhanced data set name lists, and a "cut and paste" option for records within one edit session or between edit sessions.

Access to MAX
Type MAX at the CIT/Titan Primary Option Menu.

For More Information
For additional information on MAX, consult the documentation offered by CIT. See Section 5.4 for ordering information.

7.2.1.3 MVS/QuickRef

MVS/QuickRef is a pop-up reference tool running under ISPF that allows users to look up information (e.g., on error messages, ABEND (Abnormal ENDing) codes, command structure) and get answers quickly online. The term "pop-up" in this context refers to MVS/QuickRef's ability to "pop up" over the current application and display information rapidly, no matter which ISPF application or panel is active.

Access to MVS/QuickRef

- Type QW directly at the ISPF command line.

  or

- Type C for Additional Products at the CIT/Titan Primary Option Menu.

7.2.1.4 NIH WYLBUR

NIH WYLBUR is an interactive system, available on full-screen terminals, for batch job entry and tracking, coding and execution of command procedures, text editing, and document formatting, with features that simplify many data processing tasks. It runs under TSO.

NIH WYLBUR provides interactive access to disk data sets whose names begin with the USERid format aaaaiii. The commands are common English words, usually verbs, which describe the work to be done. The JES2 interface provides a remote job entry and remote job output (RJE/RJO) facility for submitting batch jobs, monitoring their job status, and manipulating by canceling, purging, or printing the jobs' input and output.

Access NIH WYLBUR in several ways:

- Type TSO WYLBUR on any command line within the CIT/Titan Primary Option Menu (ISPF).
- Type WYLBUR on the ISPF Command screen (option 6 on the CIT/Titan Primary Access Menu).
- Type WYLBUR at the TSO READY prompt.

Scrolling the Screen in WYLBUR
In WYLBUR you can scroll back to output that has disappeared off the screen by using the IBM Session Manager. Without Session Manager, the Titan full-screen mode would prevent scrolling back to previous output.

To use Session Manager:

- On the TSO/E LOGON screen, enter **sessmgr** as the value for Procedure.
- On the CIT/Titan Primary Option Menu, enter **x.**

  You must exit ISPF to use Session Manager. It will not work under ISPF.
- On the TSO Session Output screen, enter **wylbur**.

  You may begin using WYLBUR.

To return to ISPF after you have ended your WYLBUR session, enter **SPFMAIN**.

Follow these guidelines:

- Use F7 to scroll backwards and F8 to scroll forwards.
- You must define a set break character to be able to leave collect mode. For example:

  set break BRK

  You can then exit collect mode by entering BRK as the first characters on any line.
- The modify and retry commands are tricky to use because the cursor is not positioned properly.
- You may sometimes have to enter an extra carriage return to see your output.

For more information about Session Manager, refer to the *TSO/E User's Guide*. Go to the CIT publications Web page (see Section 5.4.1) and select Time Sharing Option (TSO) under OS/390 Systems.

For More Information
Titan's NIH WYLBUR is somewhat different from NIH Extended WYLBUR, on the former South System. For more information on NIH WYLBUR, go to:

http://silk.nih.gov/public/PUBLIC.@WWW.TITAN.SOUTH.WYLBUR.HTML

7.2.2 CICS (Customer Information Control System)

CICS is a transaction server that supports many concurrent users and allows access to a diverse group of database files. It functions as a general-purpose database/data communications system that supports a variety of terminal types and Web interfaces. CICS serves as an interactive interface between the user and the application program.

Features:

- executes by itself in a single-tier architecture or as either a client or a server in a multi-tier architecture.

- interfaces with an external security manager to provide security to the data files, the transactions, and all of the required resources
- supports programs written in JAVA, ASSEMBLER, C, COBOL, and PLI
- functions with commercial software designed to use CICS as its communications interface

Applications that require CICS are subject to prior approval by CIT. The user and CIT jointly develop the protocols for accessing the user's application. For additional information, contact the TASC help desk.

7.2.3 ACS WYLBUR

> ACS WYLBUR will no longer be provided on Titan after the upgrade to the z/OS operating system, scheduled for summer 2004.

ACS WYLBUR is a high-level, commercial, online software system with features that simplify many data processing tasks. Using English language commands, ACS WYLBUR offers powerful interactive text or data editing and online processing control for program development or production program processing.

ACS WYLBUR allows the user conversational access to the facilities of the computer system. Users can enter, retrieve, update, and store data. Programs may be created, tested, and executed with the results available at a dummy remote "RMT99" for viewing with the fetch command.

All data files to be accessed interactively must be OS data sets with standard data set names (see Section 10) and must be stored on disk. Tape data sets must be transferred to disk prior to interactive processing.

The commands are easy to use. They are common English words, usually verbs, which describe the work to be done. The JES2 interface provides a remote job entry and remote job output (RJE/RJO) facility for submitting batch jobs, monitoring their job status, and manipulating by canceling, purging, or printing the jobs' input and output.

For information on NIH WYLBUR, which runs under TSO, see Section 7.2.1.4.

7.3 DATABASE SYSTEMS

This section describes the database systems supported by the Titan system of the NIH Computer Center. For more information on database facilities supported at the Computer Center, connect to:

http://datacenter.cit.nih.gov

and select Database Services. See Section 5.2.4 for information on database assistance.

7.3.1 ADABAS

ADABAS is a database management system in which the relationships between data items are stored separately from the physical data. It provides users with the ability to alter how the data is perceived for different applications. It also permits changing data relationships dynamically without requiring that the data format be altered or existing programs changed. An ADABAS database may evolve in scope and complexity without redesigning or reprogramming existing applications. This adaptability greatly reduces maintenance activities when requirements change.

The access structure used by ADABAS to address physical data is contained in a separate data set known as the Associator. The Associator consists of inverted lists, which are maintained for all fields designated as descriptors, and the Address Converter, which points to the actual data that resides in a separate data set.

ADABAS supports sophisticated data modeling. Users may create simple flat record structures as used in the relational model, or they may create records that contain repeating fields or repeating groups of fields. ADABAS automatically compresses data to minimize disk consumption. ADABAS also supports a general network model with multiple files containing bi-directional, many-to-many relationships between records. Such relationships are based on fields that exist in various files.

Additionally, ADABAS permits the traditional hierarchical model in which multiple files contain bi-directional one-to-many relationships between records. These relationships are also based on fields that exist in the various files.

ADABAS has its own 4GL high-level language (NATURAL). It also provides an interface to standard programming languages. Access to ADABAS may be either interactive or via batch mode. Users desiring to either establish a new or change an existing data file definition within ADABAS should contact the TASC help desk.

For More Information
For additional information on ADABAS, go to:

http://titan.nih.gov/silkad/database

and select ADABAS News.

7.3.2 Model 204

Model 204 is a database management system in which access structures, programs, and data are stored together. Model 204 provides a high degree of flexibility that encourages the use of application prototyping. This reduces the likelihood of structural changes to an application after it has become operational.

Every Model 204 file is a separate data set that consists of five tables. These tables contain directories of field names and attributes, data, inverted lists, and other control information.

Model 204 relationships are based solely on the value of data. Relating two or more records requires the existence of common data values within the records. Hierarchical and network relationships can be supported by this "commonality of data" characteristic.

Model 204 has its own easy-to-learn user language. It also provides interfaces to standard programming languages. Model 204 runs in batch mode as well as interactively.

Logging on to Model 204

Refer to Section 6 for general access information. To access Model 204 on Titan, users must have a valid Titan system USERid and password. Account sponsors can register users on their account for Model 204 using Web Sponsor (see Section 2.3). The following example shows the commands that are used to log on and log off Model 204:

To sign-on: `LOGON userid`

To sign-off: `LOGOFF`

Users desiring to establish new Model 204 files should contact the TASC help desk.

Security Features

RACF protects data from unauthorized access. Model 204 has additional security features that include individual logon accounts and passwords, as well as file passwords for accessing secure files or groups of files.

Web Access

Model 204 can be accessed through the Web using SILK (Secure Internet-LinKed) Web technology. Web users can issue Model 204 commands, execute existing Model 204 programs and APSY subsystems, and create ad hoc queries. Go to:

http://titan.nih.gov/silkad/database

and select NIH Model 204.

Model 204 commands that can be issued from a Web browser include:

- LOGWHO (list all active Model 204 users)
- DISPLAY (PROCEDURES and FIELDS)
- VIEW (ERRORS, PARAMETERS, and UTABLE)
- DELETE PROCEDURE

APSY subsystems, such as BUMPME (remove an active user from the online system), can also be used.

Users can invoke stored or ad hoc Model 204 procedures that will return one-line reports, full-screen formatted reports, or print all information (PAI) unformatted reports. Output can be printed on a local or remote printer, or viewed from the browser. For more information on SILK, see Section 7.5.

7.3.3 IMS (Information Management System)

IMS (Information Management System) is a database/data communication (DB/DC) facility that supports user-written batch processing and teleprocessing applications. Using the IMS facilities in a combination of batch and teleprocessing modes permits the efficient and orderly development of data management applications. IMS/VS user application programs may be written in Assembler Language, COBOL or PL/I.

IMS is a hierarchical database management system. It is appropriate for very large databases that will be accessed by many users at one time. A professional database administrator or programmer is required to set up the database's structure and keep track of implementation. Requesting a report with information formatted or selected in a new way requires extensive applications programming and cannot be done on short notice.

The database management facility of IMS is also referred to as Data Language/One or DL/I. The Batch Terminal Simulator (BTS II) is designed to operate as a batch program and provides a comprehensive development and debugging tool for IMS applications.

The NIH Administrative Database (ADB), which is used for functions such as purchasing (DELPRO), inventory, and travel, is maintained in IMS. ADB users must register with the Administrator of the Administrative Database so that the proper account can be billed for the IMS resources consumed and the appropriate IMS security can be assigned.

Access

IMS can be accessed using QWS3270 PLUS or QWS 3270 Secure. QWS3270 Secure instructions contain separate configuration directions for IMS/ADB users to allow them to connect directly to IMS. If you use QWS3270 Secure, set the "Port to 2324 for the direct encrypted connection to IMS. If you use QWS3270 PLUS, set the "Port" to 2325.

For further information on QWS3270 PLUS or QWS 3270 Secure, see Section 6.2.2. Any problems in using IMS or interfacing with it should be directed to the TASC help desk.

Use of IMS/VS is restricted to projects approved by the Computer Center. This restriction is necessary because the NIH Computer Center's capacity to deliver the quantity and quality of support required by IMS/VS is limited. For more information, contact the TASC help desk.

For More Information
IMS documentation is available from the CIT publication service. See Section 5.4.

7.3.4 Relational Database Services

The NIH Computer Center offers relational database systems (including IBM DB2 on Titan, Microsoft SQL Server, and Oracle) to its users in an environment where users can manage their own databases and applications.

For more information, go to:

http://silk.nih.gov/dbtech

Using Titan as an Oracle Client
Titan provides the connectivity software that allows Titan users to access Oracle databases residing on other server environments. Titan sends a request to an Oracle database, where it is processed. The Oracle database then sends the result back to the Titan user. There are batch cataloged procedures (procs) on Titan to facilitate making the requests to Oracle databases. CIT also offers hosting and management of Oracle relational databases on the CIT EOS (Unix) systems (see Section 1.1.2).

For more information, go to:

http://titan.nih.gov

Click on Database Technologies and then select Oracle.

7.4 PROGRAMMING LANGUAGES

The NIH Computer Center supports a number of programming languages, offering a wide range of capabilities.

For More Information
For further information, refer to the *Titan Batch Processing* manual and the documentation for the individual programming languages available from the CIT publication service. See Section 5.4 for information on the CIT publication service.

7.4.1 COBOL

COmmon Business Oriented Language (COBOL) is used for non-scientific applications. The version of COBOL on Titan is compatible with the American National Standards Institute (ANSI) standard and contains a number of IBM extensions. COBOL is based on a well-defined, restricted form of English.

Access
A COBOL compilation can be initiated in foreground and batch (background) processing by entering ISPF. The TSO/ISPF COBOL compiler is found in ISPF panel 4.2 for foreground and panel 5.2 for batch.

7.4.2 VS FORTRAN

FORTRAN is one of the most commonly used languages for scientific and engineering applications. The VS FORTRAN compiler is available on Titan. The VS FORTRAN compiler meets the 1978 ANSI standard (also known as FORTRAN 77).

Access
The VS FORTRAN compiler (Version 2 Release 3.0) is available interactively from TSO/ISPF and in batch mode. The TSO/ISPF VS FORTRAN compiler is found in ISPF panel 4.3 for foreground, and panel 5.3 for batch.

7.4.3 PL/I

PL/I is a multi-purpose language used in business and scientific applications. PL/I contains most of the capabilities of FORTRAN and COBOL as well as some additional features.

Access
The Titan PL/1 compiler is the PL/1 Optimizer Compiler. It is available interactively from TSO/ISPF and in batch mode. The TSO/ISPF PL/1 compiler is found in ISPF panel 4.5 for foreground and panel 5.5 for batch.

7.4.4 High Level Assembler

The IBM Operating System High Level Assembler is a symbolic programming language used to write programs for the IBM mainframe system. The language provides a convenient means for representing the machine instructions and related data necessary to program the IBM mainframe system. Assembler Language is generally used for system programming where machine-dependent operations are required that cannot be performed using one of the higher-level languages such as COBOL or FORTRAN. The Assembler program processes the language, provides auxiliary functions useful in the preparation and documentation of a program, and includes facilities for processing the Assembler macro language.

Access
The Titan Assembler compiler is available interactively from TSO/ISPF and in batch mode. The TSO/ISPF Assembler compiler is found in ISPF panel 4.1 for foreground and panel 5.1 for batch.

7.4.5 REXX

REXX (Restructured EXtended eXecutor), which runs under TSO, provides a fully functional application development environment, including structured programming techniques, logical and arithmetic operations, and communication with the TSO end user. REXX features a choice of compiled or interpretive execution, convenient built-in functions, free-format coding, debugging capabilities, and very extensive parsing and character string manipulation.

The Compiler and Library for REXX provide a common user application interface so that REXX applications can be ported between mainframe, OS/2, and VM/CMS systems. The REXX Compiler and Library allow users to translate frequently used routines into compiled REXX programs. The REXX Library also contains common routines that are accessible to all compiled REXX programs.

The REXX documentation is available from the CIT publication service (under the TSO category). See Section 5.4.

Access
The Titan REXX compiler is available interactively from TSO/ISPF and in batch mode. The TSO/ISPF REXX compiler is found in ISPF panel 4.14 for foreground and panel 5.14 for batch.

7.5 SILK WEB TECHNOLOGIES

SILK (**S**ecure **I**nternet-**L**in**k**ed) Web technologies were developed for users of the NIH Computer Center. Users can take advantage of SILK Web technologies to access any sequential data set or PDS member from a Web Browser, download files, issue TSO commands, change RACF passwords, locate a user or the account sponsor, and perform many other functions.

The data may be any type of output supported by Web browsers—including plain text, html, gif, jpeg, or other binary files. All SILK reports are protected by RACF, the IBM mainframe security software.

The EOS (Unix) platform provides SILK Web facilities for easily building applications to obtain, examine, update, and store information using Web browsers. SILK technologies permit applications to be implemented on the platform that is most appropriate for their requirements.

For More Information
For more information, go to:

http://titan.nih.gov

7.5.1 SILK Web-Based Services

There are many important Titan services that are available via SILK Web pages. Web RACF allows users to perform RACF functions. See Section 4.7.4. Web Sponsor is a tool for account officials to make changes to accounts and display information. See Section 2.3. Users can view SILK pages on their monitors, download them to a personal computer, or print them on local or remote printers.

The following figure provides a summary of many of the SILK-based services.

Figure 7-1. SILK-Based Services for Titan

Service	Address
General NIH Applications	
Customer Locator	http://titan.nih.gov/locator (See Section 1.3.2.)
Human Resources Information and Benefit System (HRIBS)	http://silk.nih.gov/hribs/display
Accounts	
Password Reset	http://silk.nih.gov/passwordset (See Section 2.3, 4.7.1)
Web Sponsor	http://websponsor.cit.nih.gov (See Section 2.3.)
Web Sponsor via NIH Login	http://websponsor.cit.nih.gov/nihlogin (See Section 2.3.)
Connectivity	
NIH Connectivity Tools	http://titan.nih.gov/silkad/tcpip (See Section 6.2.2)
Mainframe	
Job Scheduler	http://titan.nih.gov/job/scheduler

Service	Address
	(See Section 9.6.)
Security (RACF)	https://titan.nih.gov/racf (See Section 4.7.4.)
TSO Commands	http://titan.nih.gov/tsocmd (See Section 7.2.1)
Utilities	http://silk.nih.gov/silk/silkinfo/utilities.html
Display or Purge Jobs	https://titan.nih.gov/util/dispjoq (See Section 9.6.)
Easymail	http://titan.nih.gov/easymail (See Section 7.9.1.)
Export South Tape	http://silk.nih.gov/export-tape (See Section 10.2.5)
Formsmail	http://silk.nih.gov/formsmail/doc (See Section 7.9.2)
Manage Migrated Data Sets	http://silk.nih.gov/oldmigr (See Section 10.1.1.2.)
Purchase Tape	http://silk.nih.gov/purchase-tape (See Section 10.2.5)
View or Download Mainframe Public Data Sets	http://titan.nih.gov/silkad/pubutil
View or Download Mainframe Private Data Sets	http://titan.nih.gov/silkad/privutil
Web Listoff	http://titan.nih.gov/listoff (See Section 8.4.)
Web Submit	http://silk.nih.gov/submit (See Section 9.6)
Web Tape	http://silk.nih.gov/tape/dispdel (See Section 10.2)
Database	
Database Technologies (DB2, ADABAS, Model 204, Microsoft Server and Oracle)	http://titan.nih.gov/silkad/databasn (See Section 7.3)
EZStart	http://silk.nih.gov/dbtek/ezstart
SQL Processor	http://silk.nih.gov/dbtek/sqlproc?first=YES

Service	Address
SILK Servers	(See Section 7.5.2)
Create and Manage Customized Servers	http://silk.nih.gov/msilk (See Section 7.5.2.4)
Public Server	http://titan.nih.gov/public (See Section 7.5.2.2)
Secure Server	http://titan.nih.gov/secure (See Section 7.5.2.2)

7.5.2 SILK Web Server Options

There are three SILK Web server options available for Titan that allow users to display mainframe data:

- a public server (displays a file to anyone with a browser)
- a secure server (displays files to a limited group of viewers)
- a customized server (set up and managed by the user to display mainframe files or files uploaded from the owner's workstation)

You can use public, secure, and customized servers to view Titan data sets from the Web by creating a link such as:

http://titan.nih.gov/secure/dsname
http://titan.nih.gov/public/dsname
http://titan.nih.gov/silk/myserver/mypage

where "dsname" is your data set name
"myserver" is the name you give to your server
"mypage" is the name you give to the Web page

The owner of a mainframe data set controls access to the data set being displayed. Access can be "universal" or restricted to individuals or groups by using mainframe RACF commands. SILK data sets are mainframe data sets with full RACF protection—they can be made as secure as any other mainframe data set.

For more information concerning SILK Web technology on Titan, call the TASC help desk.

7.5.2.1 Public Server

This server contains data available to anyone with browser software and an Internet connection. Data sets for public access should be defined in RACF with "UACC=READ."

Go to:

http://titan.nih.gov/public/

and then type in the name of the data set that you want to view.

For information on creating data sets for the public server, see Section 7.5.2.3.

7.5.2.2 Secure Server

Anyone accessing the Titan SILK secure server must supply a valid Titan USERid and RACF password. The USERid will be checked for RACF authority to read the data set. It is the data set owner's responsibility to establish and maintain appropriate RACF control of Web accessible mainframe data sets. The secure server uses RACF to control access to stored data.

For example:

http://titan.nih.gov/secure/userid.@WWW.MYDATA

For information on creating data sets for the secure server, see Section 7.5.2.3.

7.5.2.3 Mainframe Data Set Format

Creating Data sets for the Public and Secure Servers

In order to display the data set via SILK:

- Create a data set on the Titan system with "@www" as a qualifier in the data set name.
- Set the level of RACF control for the data set. This determines the access limitations.
- Use your Web browser to go to the SILK Web page (http://titan.nih.gov).
- Select either the public server or the secure server.
  - Enter the data set name on the secure or public Web page, depending on the level of RACF control set for the data set.
- Display, download, or print that data set.

The NIH Computer Center takes care of all server maintenance. All you need are a few simple lines of html code stored on the mainframe.

Graphics Files
If you want to display a graphics file (e.g., a GIF or JPEG file); upload the file from your desktop computer, via FTP, using binary format. Specify RECFM VB on the mainframe. Make sure the file conforms to the naming requirement described above. Specify an extension of GIF for a GIF file, and JPEG or JPG for JPEG files.

Naming Data sets for the Public and Secure Servers
The naming conventions require the following elements:

- a Titan USERid
- "@www" as a qualifier. The "@www" naming convention adds an additional layer of security because it prevents Web access to other mainframe data sets.
- the correct suffix

Suffix	Meaning
HTM or HTML	HTML code
DSNCC	mainframe format with printer control characters in column 1
none	the default is text

Examples of Web-enabled Titan data sets are:

userid.@WWW.MYDATA
userid.MYDATA.@WWW.HTM

7.5.2.4 Customized Servers

Customized SILK servers allow users to create and manage their own full-function SILK Web server without having to purchase and maintain hardware or software. The operating system for a customized SILK server is transparent to the user. A customized SILK server can be set up by anyone with a CIT Titan (mainframe) USERid, a Web browser, and an e-mail address. You can upload pages directly from your desktop computer using SILK's file transfer facility. You can also access data sets stored on Titan through a customized SILK server. For information on linking mainframe data sets to pages on a customized SILK server, see below.

SILK Web server owners can define and control access to their servers—providing the basis for a corporate intranet facility. There are three access security levels:

- "unrestricted" (for anyone with a Web browser)
- "registered users" (limited to CIT users)
- "designated users" (the owner designates the specific CIT userids that will have access privileges).

SILK server owners can choose to apply an optional "group password" available to all three levels of access. In addition, secure socket layer (SSL) protection provides for data encryption across the network.

To set up a customized SILK server, go to:

http://titan.nih.gov

and choose Create and Manage Customized Servers (under SILK Servers). At the Customized Servers page, select Create Server and enter a name for the server. When you set up a SILK Web server, you must comply with your agency's Web server policies. If you are associated with NIH, you will have an opportunity to read the NIH server policies. A server will not be created until after you have indicated that you have read and understood your agency's policies.

Once you have created the server, you can make changes to it, such as adding a co-owner, changing the name or description of the server, changing the security level, adding the server to a registry of SILK servers, etc. Go to the Customized Servers page, look in the Manage Server area, and click on the name of the server that you wish to change. To transfer files to your customized SILK server, go to the Customized Servers Page, scroll down, and select the File Transfer Facility. You can also link mainframe data sets to your customized SILK server. For detailed information, see below.

Customized Servers with the SSL Encryption Option
SILK servers can take advantage of SSL (Secure Sockets Layer) encryption. SSL encryption protects the data being transferred between the Web server and the Web browser. The data that are transferred are encrypted, and therefore not visible as they travel across the network. To include the SSL feature for your customized SILK server, check the SSL box on the Manage Server page. There is an additional charge for using the SSL option. See Section 3.1 for charging information.

Linking Mainframe Data Sets to Pages on a Customized SILK Server
SILK Web's customized servers allow users to associate mainframe data sets with Web pages (URLs) on a customized SILK server. Owners of SILK customized servers can go to:

http://silk.nih.gov/msilk

to see a list of all their SILK customized servers. To associate a page on the server with a data set stored on Titan, do the following:

- click on a server name
- choose the option "Add a page using an existing MVS file"
- type the name for the page on your SILK server and click the "Add" button
- on the form that is displayed, type the data set name to be associated with the Web page

- select the appropriate document type for the Web page from the drop-down list box

Document type	Description
"text/html"	for data sets containing html tags
"text/plain"	for data sets containing text only
"dataset/cc"	for data sets containing text with a carriage control (cc) character in column 1
"suffix"	for data sets that have a document type as the last qualifier in the data set. With the "suffix option" the Web page name aaaaiii.mypage.html is interpreted as "text/html" whereas aaaaiii.myimage.gif would be interpreted as "image/gif."

- select the "Create" button

Example:

> If you have a server called "Personnel," you can create a Web page for that server called "Leave." Associate the data set aaaaiii.hr.leave (where aaaaiii is your Titan USERid) by following the instructions above. Each time a browser requests http://silk.nih.gov/silk/personnel/leave, your customized server will display the contents of the mainframe data set aaaaiii.hr.leave.

(The initial part of Web addresses—http://silk.nih.gov/silk/personnel/—is not included in the following examples.)

Additional Information for Partitioned Data Sets
SILK allows users to link a Web page to a member of a partitioned data set (PDS).

Example:

> You can create a Web page called "policies/overtime" and associate it with a member of the partitioned data set "aaaaiii.hr.policy(ot)."Note that the Web page name can contain "/" to indicate subdirectory.

Wildcards in Web Addresses
SILK permits Web page addresses containing wildcards. Wildcard pages use "*" to indicate a value that will be determined by the URL requested. A portion of the page name determines the mainframe data set name to be displayed. With wildcard Web pages, you do not have to manually associate each Web page with a specific data set.

Examples:

A Web page called "Vacancies/*" can be associated with the mainframe data set "aaaaiii.vac.*". When someone types the full Web address into the browser window, the portion corresponding to the "*" will be substituted into the "*" in the data set name. If the incoming Web address is vacancies/tech/cs001, then the mainframe data set "aaaaiii.vac.tech.cs001" is displayed. Note: a "/" in the Web address is automatically converted to a "." in the data set name.

The Web page name called "Training/*" can be associated with a member of a mainframe partitioned data set "aaaaiii.train.course(*)."Whenever the Web address training/crs1234 is requested, the corresponding data set "aaaaiii.train.course(crs1234)" would be displayed.

The NIH Computer Center strongly recommends the use of RACF profiles to protect the mainframe data set that you display on the Web from unwanted access. See Section 4.7.3 for further information.

7.5.3 Web Interfaces for User Applications

Creating a Web interface for your mainframe applications makes them accessible with the easy-to-use features of a browser. The mainframe's RACF facility provides complete security for your data, and only authorized accounts will be allowed to see your Web data. Using SILK Web interfaces you can:

- store reports on the mainframe in Web-enabled formats
- limit access to information to the appropriate accounts
- initiate queries from the Web to run against mainframe databases
- view the results of queries through the browser

Contact the TASC help desk for more information.

7.6 SCIENTIFIC STATISTICAL SYSTEMS

This section describes scientific statistical systems available on Titan. Contact the TASC help desk for more information on statistical packages or visit:

http://statsoft.nih.gov

7.6.1 Statistical Analysis System (SAS)

SAS embodies an integrated approach to file management, data manipulation, statistical analysis of data, and report writing. SAS uses a simple parameter language to specify requests. Included in the language are statements that edit, transform, generate, describe, manage, and analyze data by building and operating on SAS data sets, VSAM files or

sequential files. In addition to the basic SAS system, there are many other products in the SAS suite available on Titan. See Section 7.6 for the appropriate Web site.

TSO CLISTs
SAS is also available interactively under TSO through the following CLISTs:

%SAS	For initial entry into the system
%SAS GO	To reenter the system during the same TSO session.
%SUPPORT	Gives the entry into SAS NOTES and SAS SAMPLE libraries through a menu-driven facility.

Access
To access SAS, select L (Local) from the CIT/Titan Primary Option Menu, and then select the SAS option.

7.6.2 SPSS

SPSS provides capabilities for extensive file handling and data management tasks, including advanced statistical analysis procedures (e.g., discriminate analysis, nonlinear and logistic regression analysis, and multivariate analysis of variance). SPSS runs on Titan in batch mode. CIT also supports many SPSS products on Windows and Mac operating systems.

7.7 INTERACTIVE OUTPUT FACILITY (IOF)

The Interactive Output Facility (IOF) provides users with complete access and control over their generated print spool output and input batch jobs. IOF lets users track the progress of a job and view the output. There is a tutorial (Quick Trainer) and a help screen at every panel when viewing the printed output, selected portions, or components of a spooled job. In the basic TSO environment, IOF will also run from the READY prompt.

Access
To use IOF, select IOF from the CIT/Titan Primary Option Menu, or enter IOF at the TSO READY prompt.

For More Information
For additional information on IOF, consult the *Titan Batch Processing* manual and other documentation offered by CIT. See Section 5.4 for more information.

7.8 DOCUMENTATION SOFTWARE

IBM BookManager Online Documentation System

Titan supports IBM BookManager for viewing online documentation such as user's guides, product specifications, maintenance manuals, procedures manuals, vendor's publications, reports, articles, and bulletins.

Online information has the familiar book appearance on the viewer's display screen, and allows you to:

- open to a specific place in the book
- scroll forward and backward
- use the table of contents and index
- go directly to any chapter or topic
- group books on a bookshelf
- link to other books (hypertext)

Access

To browse the BookManager Bookshelf List, which includes IBM manuals, go to the CIT/Titan Primary Option Menu. Select C for Additional Products, and then select B for Books.

CIT only supports the READ function of BookManager. For additional information on IBM BookManager, contact the TASC help desk.

7.9 TITAN E-MAIL SERVICES

Users can send e-mail through the Titan system using a Web (Easymail and Formsmail) or batch (Sendmail) interface. Titan does not have a facility that allows users to receive e-mail.

Note: The electronic mail service supported by CIT is the Central Email Service (CES). The CES provides e-mail, scheduling, and other messaging services to the NIH community. NIH users are encouraged to take advantage of this service. There is no direct charge for CES to NIH ICs. Contact the TASC help desk for further information or go to:

http://www.mail.nih.gov

7.9.1 Easymail

Easymail allows Titan users to send e-mail from the Web. Among the options you can specify are:

- multiple addresses (To:)
- copies (CC:)
- an alternate return address for replies—the address where you receive your e-mail

To use Easymail, go to:

http://titan.nih.gov/easymail

and log on with a Titan USERid.

Web page developers can add e-mail to their pages using a hypertext link to Easymail. To invoke Easymail from a Web page, use the following HTML coding:

```
<a href="http://titan.nih.gov/easymail">
Send e-mail</a>
```

Clicking the "Send e-mail" link displays the Easymail form.

You can also have e-mail sent to a pre-specified e-mail address by including "?to=" in the HTML (hypertext markup language) coding. For example, to send e-mail to the "webmaster@my.site.gov" address, include the following code:

```
<a href="http://titan.nih.gov/easymail?to=webmaster@my.site.gov">
Send e-mail to Web Master</a>
```

In this case, the Easymail form would be initialized with "webmaster@my.site.gov" as the To: address. **Note:** the person sending the mail must have a Titan USERid to access Easymail.

7.9.2 Formsmail

Formsmail is a SILK Web facility that sends information collected using an online Web form directly to a specific, predetermined e-mail address. With Formsmail, a registered user can set up a form on any Web server (including SILK Web customized servers) and receive the resulting information via e-mail. For more information go to:

http://silk.nih.gov/formsmail/doc

7.9.3 SENDMAIL Procedure

The SENDMAIL utility is a batch procedure used for sending e-mail from Titan. Refer to the *Titan Batch Processing* manual for a full description of this procedure.

7.10 FILE MANAGEMENT SYSTEMS

The following file information systems run on Titan but receive limited support from CIT.

7.10.1 VISION:Builder

VISION:Builder (previously known as MARK IV) is a general-purpose file management and reporting system. The system can process multiple coordinated input files, create multiple output files, update or create a new master file, retrieve data by selection criteria, and produce multiple user reports with summary statistics, all in a single pass of the master file.

VISION:Builder supports fixed and variable length sequential, and virtual sequential (VSAM) files. The system is easy to use due to system defaults and automatic operations. VISION:Builder is adaptable to most commercial data processing applications.

Access

VISION:Builder runs in batch mode using standard JCL or interactively from TSO/ISPF. At the CIT/Titan Primary Option Menu, select C for Additional Products, and then select VI for VISION:WorkBench Facility for interactive execution.

7.10.2 VISION:Report

VISION:Report (previously known as Quick Job) is a program development and report writing tool utilizing a free-format, COBOL-like language. It allows users to build and execute programs, minimizing the amount of programming time and effort to fix a file, prepare a report, or generate test data.

Access

VISION:Report is available on Titan in batch mode.

7.10.3 IRS

IRS is a general batch-oriented information management system. It provides the user with a fast, efficient, easy-to-use technique for extracting information from computer files, performing basic data processing operations, and producing printer, tape, and disk output. IRS runs in batch mode only. IRS is an older product that is not fully supported by CIT. Use it at your own risk.

8 PRINTING SERVICES

This section introduces the facilities for producing printed output for Titan. Printing services are available through batch jobs and NIHnet connections. The *Titan Batch Processing* manual includes a comprehensive description of printing services for Titan, including the following topics:

- carriage control
- character sets
- form control buffers (FCBs)
- forms for laser and impact printing
- Hardcopy utility of ISPF
- hexadecimal tables for character sets
- labels
- job control language (JCL) statements used by batch jobs to select output options
- SYSOUT classes
- table reference characters (TRC)
- user-supplied forms

OUTPUT HOLD

All jobs in OUTPUT HOLD on Titan are purged (except for SYSOUT=I which is printed) after 7 calendar days—this includes weekends. Jobs awaiting output for more than 14 calendar days will be purged even if routed to a remote or another NJE node. Refer to the *Titan Batch Processing* manual for information on SYSOUT classes.

Output Boxes

All output printed on the central printers must have a box number associated with the job. (See Section 5.6.1.) On the Titan system, the box number for the job is actually stored in the field that JES2 calls "room."

Jobs Run at Other NJE (Network Job Entry) Nodes

Users who run jobs at other NJE nodes and then route the job to print on Titan must add the following statements after their JOB statement:

```
/*JOBPARM ROOM=bbbb
/*NETACCT userid
```

where "bbbb" is the box number for the output and "userid" is the Titan USERid. If you want the output placed in one of the boxes in the Parklawn building, include the letter "P" in front of the box number. Without the /*JOBPARM ROOM=bbbb statement, your output may not print, may go to the wrong box, or may be discarded. If there is no /*NETACCT control statement—or if the Titan USERid on the NETACCT statement has not been registered to

use NETACCT—then the SYSOUT from the non-NIH node will be rejected by Titan. The SYSOUT will be sent back to the sending node.

Refer to Section 6.4.3 and the *Titan Batch Processing* manual for more information on Network Job Entry.

Output Delivery
All Titan output is printed at the NIH Bethesda site. When the operators are sorting the output, any output that has a box number that begins with a "P" will be placed in the box corresponding to that number in the Parklawn building. If the box number does **NOT** begin with a "P," then the output will be placed in the box corresponding to that number in building 12A at NIH. Output designated for Parklawn boxes will be delivered to the CIT Offsite Distribution Center in the Parklawn building (room 2B-70). See Section 5.6.1.3 for courier service information.

For More Information
For further information on printing services, consult the *Titan Batch Processing* manual or contact the TASC help desk.

8.1 NETWORK PRINTING SERVICES

Users can print output from the Titan to printers accessible via NIHnet or the Internet using the VPS printing service. The output goes to printers attached to a PC, Mac, workstation, or local area network (LAN) connected to NIHnet and running an LPD server. AppleTalk printers are supported in conjunction with the PrintShare services provided by CIT See Section 6.5.4 for more information on VPS.

8.2 RJE WORKSTATION FACILITIES

> CIT plans to phase out support for RJE connections. New requests for RJE telecommunications connections are no longer being accepted. We encourage users to access Titan through network connections. Contact the TASC help desk for assistance and to deregister from RJE service.

Remote Job Entry Workstations are located at users' sites and communicate with the NIH Computer Center mainframes over telephone lines. Job output as well as individual SYSOUT data sets can be directed to a remote workstation. Because the remote workstations are obtained by individual organizations, they vary in their facilities, services, and regulations. (For example, different types of paper are offered by some remotes and not by others.)

For more information on remote workstations and remote job submission, see Section 11.2 and the *Titan Batch Processing* manual.

8.3 VTAM PRINTERS

VTAM printers are (usually low-speed) printers that are part of the SNA network and are located at users' sites. They are connected to controllers that communicate with the central facility via dedicated lines. They can be defined as RJE printers and the output routed to them use their VTAM node name. See Section 11.2.

A good alternative to VTAM printers is the VPS printing service. See Section 6.5.4 for information on VPS.

8.4 WEB LISTOFF

Using SILK's Web Listoff facility, you can print data sets through the Web. Any non-VSAM data set—**except** those in WYLBUR edit format—can be listed offline. Since all data set access is controlled by RACF (see Section 4.7), Web Listoff lets you print the data sets that your USERid has authority to read.

To print a data set through the Web, go to:

http://titan.nih.gov/listoff

Enter your USERid and password in the browser security window. When the form appears, specify the data set name and the following options for listing offline:

- box number
- title
- remote printer number
- number of copies
- hold (optional)
- form (optional)
- character set (optional)

Once you submit the form, the screen will display the number of the batch job that will actually create the listing. You will be able to pick your listing at the specified output box (see Section 5.6.1) or remote printer.

9 BATCH JOB SERVICES

The batch processing facility of the Titan system allows users to submit a job or computer program to the mainframe processors. The NIH Computer Center provides an extensive set of batch utility programs to aid the user in the areas of data management and manipulation. Users can print job output or examine it at their desktop workstations. Refer to Section 9.6 for information on managing batch jobs through the Web.

For More Information

Only a brief introduction to batch job services is presented in the *Titan User's Guide*. Refer to the manual *Titan Batch Processing* for complete information on running batch jobs, methods of submission, job class summaries, job turnaround times, job control language statements, and the procedures for using batch utility programs and cataloged procedures. CIT also provides other documentation related to batch processing. See Section 5.4 for information on viewing and ordering documentation.

9.1 OPERATING SYSTEM OVERVIEW

The IBM mainframe operating system introduces programs to the computing system, initiates their execution, and provides all the resources and services necessary for the programs to carry out their work. The operating system is made up of a general library of programs that can be tailored to meet many requirements. The installation can select the systems programs that it needs, add its own programs to them, and update existing programs as needs change.

For illustrative purposes, the programs and routines that compose the operating system are classified as a control program and processing programs. The control program:

- accepts and schedules jobs in a continuous flow (job management)
- supervises each unit of work to be done (task management) on a priority basis
- simplifies retrieval of all data, regardless of the way it is organized and stored (data management)

The processing programs define the work that the computing system is to do and simplify program preparation. Processing programs consist of:

- language translators (such as the FORTRAN compiler)
- service programs (such as the Binder)
- problem programs (such as users' programs)

For a description of the Titan operating system, see Section 7.1.

9.2 JOB CONTROL LANGUAGE OVERVIEW

Job Control Language (JCL) is the means by which the user communicates the resource requirements for a job to the operating system and various components of the mainframe

system. Through JCL, the user instructs the computer on what to do with programs, data sets, and I/O devices.

> Former North System JCL and South System JCL will work on Titan, with minimal changes. For more information, go to:
>
> http://silk.nih.gov/silk/titan

Titan uses software called ThruPut Manager to convert JCL from the former NIH mainframe systems to run on Titan. It recognizes the format of an incoming JOB statement, converts the JCL, and directs output to the appropriate printers. ThruPut Manager also controls the flow of jobs on Titan. When a job needs tapes, it schedules the job accordingly. For additional information on batch processing and job control language for Titan, refer to the *Titan Batch Processing* manual.

9.3 JOB CLASS SUMMARY

Jobs are assigned to execution classes based on the system resources requested. There are two execution classes on Titan:

- L for Long – This is the default class. Class L has a default CPU time of 999 seconds (16 minutes and 39 seconds) and a maximum time of 999 minutes.
- X for eXpress – Class X has a default and maximum CPU time of 100 seconds (1 minute and 40 seconds). In general, jobs that execute in Class X receive a higher scheduling priority than jobs that execute in Class L.

9.4 JOB TURNAROUND

When a job has completed execution, it enters a queue to be printed or it is placed in OUTPUT HOLD (from which the user can selectively examine the output at a workstation). Use IOF (see Section 7.7), WYLBUR, or the Web-based Display or Purge Jobs facility (see Section 9.6) to track the progress of a job, review the output, or purge the job.

Output turnaround is from the time a job enters the print queue until the output has been placed in the user's output box. For information on output boxes, see Section 5.6.1. Time can vary widely depending on the services chosen. For jobs printed at the central facility with the standard printing requirements, the time for the job to be printed, separated from other jobs, and routed to the appropriate output box in building 12A will normally be two hours or less during non-discount periods. The time required for the output to be placed in the box will vary since courier times may be involved (e.g., for output directed to the boxes located at the Parklawn site). For information on the courier service, see Section 5.6.1.3.

9.5 OFF-HOURS JOB PROCESSING

To request overnight or weekend processing, you need to include the proper ThruPut Manager statement on a Titan JOB statement.

To request overnight processing, add the following control statement:

```
//*+JBS BIND OVERNITE
```

To request weekend processing, add this control statement to the JCL stream:

```
//*+JBS BIND WEEKEND
```

9.6 Job Management through the Web

You can submit batch jobs through the Web on a one-time basis or on a regularly occurring schedule. Titan also provides a Web facility for displaying or purging batch jobs. For more information on the various methods of submitting batch jobs and managing output, refer to the *Titan Batch Processing* manual.

Submitting a Single Job

There are two options for submitting a single batch job through the Web:

- Execute the TSO SUBMIT command through the Web at:

  http://titan.nih.gov/tsocmd

- Use the Web Submit facility at:

  http://silk.nih.gov/submit

  When the Web form appears, enter a mainframe data set name to be submitted as a batch job and specify the appropriate options.

  The data set must have the record format FB (fixed-length records, blocked) with LRECL=80. **Note:** the data set can not be in WYLBUR edit format. The USERid specified in the browser security window must have RACF authority of "read"or above for that data set.

  When you submit the job, the job number is displayed. If the job is rejected for some reason, that information will also be displayed. To find why the job was rejected, either examine the printed output or fetch the job.

  For further information on submitting batch jobs refer to the manual *Titan Batch Processing*.

Scheduling Recurring Work
Titan Job Scheduler allows users to schedule recurring work to run automatically. This Web-based facility gives you complete control over setting up, displaying, and modifying your batch job entries. You can schedule a job to be submitted once or on a continuing basis. Simply provide the name of your JCL data set and when you want it run—that is, on a specific date, every day, every weekday, once a week, once a month, or the first or last workday of every month. After that, your job is run automatically on the date and time you requested with no further action on your part.

To use the Job Scheduler, go to:

http://titan.nih.gov/job/scheduler

Job Scheduler lets you see what jobs you have scheduled and allows you to change the JCL in your data sets at any time, without affecting the schedule. Each time a job is submitted through Job Scheduler, an entry appears in a log. To view the log, use the Display Submission Log button from the Job Scheduler Web site.

Users who require more complex scheduling (e.g., multiple jobs that interconnect in some way, or e-mail notification of job failure) may need the services of the Automated Operations Group. Contact the TASC help desk to request this option.

Displaying or Purging Batch Jobs
Using the Web-based Display or Purge Jobs facility, you can locate your batch jobs and fetch the output. You can also use it purge jobs. Go to:

https://titan.nih.gov/util/dispjoq

10 STORAGE AND BACKUP OF DATA

The NIH Computer Center offers both disk and tape data storage. See Section 11.1 for the hardware specifications for storage devices. The NIH Computer Center does not provide for archival storage of data. Data to be archived should be copied to tape and permanently removed from the NIH Computer Center.

- Public disk storage, also known as DASD (direct access storage devices), is shared by all users for:
  - online storage of data sets (both long-term and short-term storage)
  - scratch space (for use during the processing of a batch job)

  Backups of Titan disk data are sent off-site on a regular schedule. See Section 4.5 for information on disaster recovery.

- Magnetic tape facilities are also available—both for data storage at the NIH Computer Center and for data exchange with other installations. The NIH Computer Center has an automatic tape inventory system that ensures the privacy and integrity of data on tapes.

Data Set Names

On Titan, data set names (disk or tape) must begin with either:

- a USERid (userid.dataname)

or

- a Titan account (aaa.dataname or aaaa.dataname).

Data set names that begin with an account (aaa.dataname or aaaa.dataname) are ideal for production work. Because they do not belong to an individual, they do not need to be renamed if the USERid is reassigned.

RACF Profiles

Data set access, whether it is on tape or disk, depends on having the appropriate RACF profiles in place; see Section 4.7 for information. Any user who handles or stores personal data as defined by the Privacy Act of 1974 has legal responsibilities for maintaining its security and integrity. For further information, see Section 4.

10.1 PUBLIC DISK STORAGE

There are advantages to using direct access facilities (disk) instead of tapes:

- Several jobs can read the same data set at the same time. A tape can be used by only one job at a time.
- Jobs accessing the data will be less expensive because the charge to mount a tape will be avoided. See Section 3.1 for specific details on costs.

The NIH Computer Center operates in an all-cataloged disk storage environment. All data sets must be cataloged, and all references to data sets should be made through the catalog.

It is important to remember the following:

- All disk data sets must be cataloged.
- Neither UNIT nor VOLUME should be specified when referencing existing, properly cataloged data sets. Specify DISP=SHR and the DSN.
- If a data set cannot be cataloged (probably because another data set with the same name is already cataloged), the job will fail and the data set will not be created.

Space Management of Disk Data Sets

Titan uses IBM's SMS (System Managed Storage) and HSM (Hierarchical Storage Manager) as the primary storage management software for data set migration and backup. See Section 10.1.1.

The inactive data that was originally managed by the old Automated Backup and Recovery (ABR) system will remain available to Titan users until it is either deleted after 24 months of inactivity or is used and brought back to be managed by the new system. There will be no charge for the storage of this old inactive data while it remains under the management of the old system.

10.1.1 SMS/HSM

Public disk volumes are under the control of the SMS/HSM environment. SMS simplifies data set allocation, provides efficient and flexible data set management, and facilitates the transition to new disk architectures. HSM, a part of SMS, manages data sets on groups of storage volumes and provides backup and recovery services.

SMS

For data stored on public volumes, SMS uses management classes to determine the following:

- how long to keep inactive data
- which data sets to back up
- how long to keep the backups after the data sets have been scratched
- when to stage a data set to secondary storage

When a data set is allocated—either initially or when recalled from secondary storage—SMS selects a volume with sufficient storage space and updates the catalog appropriately.

HSM
HSM places disk data on the most efficient media, based on size and usage history. HSM:

- keeps new and actively used data sets on a group of "primary" disk volumes
- moves less frequently accessed data sets onto HSM-owned "secondary" disk volumes and tapes
- tracks where each data set resides, moving ("migrating") data sets off primary volumes as space is needed, and automatically "recalling" them as they are accessed

When a public data set is created, it is placed on one of the primary disks. As these disks start getting full, the least active data sets are moved to secondary volumes. When an interactive user or a batch job references a data set on secondary storage, HSM automatically brings the data set back to one of the primary volumes. While the data sets are on these secondary volumes, the catalog indicates that they are on a volume named MIGRAT. Under ISPF, the volume shown for data sets that have been migrated to compressed disk will be MIGRAT1; the volume shown for data sets that have been migrated to tape will be MIGRAT2.

When data is migrated to secondary storage and recalled, the data set is reallocated on primary storage, as follows:

- For sequential data sets with a secondary space allocation, HSM allocates only the amount of space actually occupied by the data, releasing any unused space.
- For all other data sets, HSM allocates the total space previously allocated, whether occupied by data or not.
- Partitioned data sets are always condensed when recalled—moving all members to the beginning, and all unused space to the end of the data set.

There is no way to guarantee that a data set will remain on any particular disk volume or that two data sets will always be on different volumes.

10.1.1.1 Incremental Backup and Recovery for Data Sets

For management classes that provide backup services (DISK2YR, DISK7YR, and LONGTERM), HSM creates daily incremental backups of online data. That is, each night a backup is made of any data set that has changed since the previous day. A data set is considered changed—even if the data set is not actually modified—whenever the data set is:

- renamed
- opened for output
- opened for input/output

HSM's incremental backup system:

- maintains up to five unique backup versions per data set name

- allows users to restore any data set that is lost or destroyed to its state as of the most recent backup
- keeps backups for six weeks after the data set has been deleted (or renamed)

All changed data sets are backed up with the following exceptions:

- data sets with no DSORG (empty) or partitioned (PO) data sets with zero block size
- data sets that cannot be read (damaged PDS directory, etc.)
- data sets that are allocated with a disposition of OLD at the time HSM is trying to back them up

Use ISMF (under ISPF, select C for Additional Products) to:

- display a list of incremental backups for a data set
- restore a data set from the available backups

While these backups provide a great amount of protection for user data sets, it is not absolute. Critical data sets should be periodically saved by the user on tape and removed from the NIH Computer Center premises. See Section 4.5 for information on disaster recovery.

10.1.1.2 Managing Older Migrated Data Sets

Web Retrieve is a data set management tool for older (pre-HSM) migrated data sets. It can only be used for data sets begining with the USERid format aaaaiii that were created or restored before April 18, 1994. Web Retrieve allows users to display, retreive, rename, or delete data sets in the old mirgration system. To manage your older data sets, go to:

http://silk.nih.gov/oldmigr

Please note that the changes are performed through batch jobs and therefore may take several minutes to process.

10.1.1.3 Titan Management Classes

Figure 10-1 summarizes the unitnames that correspond to the Titan SMS management classes (not including those specific to databases).

Figure 10-1. Characteristics of Management Classes

Titan Management Class/Unitname	Backups	Length of Retention
TEMP	no	7 days
NOBACKUP	no	until deleted
DISK2YR	5	2 years after last use
DISK7YR	5	7 years after last use
LONGTERM	5	until deleted

These management classes determine which data sets are backed up and how long the data is kept.

Titan accepts the former NIH mainframe systems' (North and South) unitnames in Titan batch jobs. The unitnames, coded in the JCL, will translate into the appropriate Titan management classes, specified above, to designate how data is to be stored.

Data set naming conventions
Some data set naming conventions will assume specific management classes. That is, data sets that end with the following suffixes will assume the stated management class:

- Disk data sets whose names end with the final qualifier OUTLIST or SYSOUT are forced to be UNIT=TEMP.
- Disk data sets whose names end with the final qualifiers listed below are forced to be UNIT=LONGTERM (where * is a wildcard representing zero or more characters):

ASM	LOAD*
CLIST	OBJ
CNTL	PGM*
COB*	PLI
EXEC	PL1
FOR*	RESLIB
JCL	SCRIPT
LIB	SOURCE
*LIB	SRC
LLIB	TEXT

For example, a data set named userid.MYSTUFF.LOAD will be set to the LONGTERM management class. A data set named userid.MYSTUFF.OUTLIST will be set to the TEMP management class.

Data Sets Created through TSO
The default management class for data sets created through TSO is DISK2YR. This includes data sets created under WYLBUR. To change the default, use one of the following methods:

- On the command line at the logon screen, include the TSO UNITNAME command.
- Include the TSO UNITNAME command in a CLIST that is executed from the command line at the logon screen.
- Use the WYLBUR SET VOLUME command in your WYLBUR session.
- Include SET VOLUME (e.g., SET VOLUME LONGTERM) in your @WYLBUR.profile.

Additional information
- The system will delete any rolled-off GDG unless the expiration date has not been reached (if one was specified).
- Users can manage their disk data sets more effectively by coding EXPDT= or RETPD= to provide more specific expiration of their data sets than the broad categories offered above.

10.1.2 Estimating Direct Access Space Requirements
When allocating disk data sets, it is important to determine the best block size for the data set and the right amount of space needed to store the data. Miscalculating the amount of space needed (via blocks, tracks or cylinders) or specifying a block size that is too small or too large wastes disk space and increases storage costs. Specifying a block size that is too small can also increase the I/O charges for the job that reads or writes the data set.

The best way to allocate space is to allow the system to pick the optimum blocksize. Then, if the data set has to be moved to a new disk device with different track/cylinder architecture, it will be automatically reblocked to a new optimum block size.

When creating data sets through batch processing, use the AVGREC parameter if you know the approximate number of records you expect to put in a data set and the length of the records (or average record length for variable length records). The AVGREC parameter allows the operating system to automatically calculate both the optimum block size AND the space required for most physical sequential (PS) and partitioned (PO) data sets. Refer to the *Titan Batch Processing* manual.

10.2 TAPE STORAGE

> Web Tape is a Web-based facility that helps users with the transition to Titan. It allows former South System users to review their South System tapes and move any tapes they need to Titan. Web tape will remain in use temporarily, until further notice. To use Web Tape, go to:
>
> http://silk.nih.gov/tape/dispdel

Most Titan customer tape data resides in the Virtual Storage Manager (VSM)—a comprehensive tape storage system consisting of tape silos, disk buffers, new tape technology, and tape management software that improves performance and reduces human intervention in storing, retrieving, and mounting tapes. All VSM tapes are numbered above 500000.

Major features of the Titan tape storage system are as follows:

- The NIH tape library contains only 3490 cartridge tapes.
- 9-track and 3480 tapes can be used as foreign tapes. There are some 3480 and 3490 tapes available for purchase. To purchase a tape, go to:

  http://silk.nih.gov/purchase-tape

- See Section 10.2.4 for information on foreign tape processing.
- Tape data set names must begin with a valid USERid or RACF group (account).
- Titan tapes are owned and charged to the USERid that begins the first data set name on the tape.
- Tape data sets must have an expiration date/retention period.
- Tape data set security on Titan is handled by RACF permissions on a data set rather than volume basis. For additional information, see Section 4.7.
- In order to access any data set on a tape, you must also have access to the first data set on the tape. (CIT strongly recommends that all data sets on a tape begin with the same USERid.)
- CIT recommends (but does not require) that all Titan tape data sets be cataloged.

For More Information
Additional information concerning the use of tapes is available from:

- the *Titan Batch Processing* manual
- http://silk.nih.gov/silk/tapes
- tape documentation available from the CIT publication service—see Section 5.4.

Removal of Tapes
Tapes in the VSM can not be removed from the NIH Computer Center. Users can copy the data from VSM tapes to their own foreign tape or purchase a 3480 or 3490 tape from CIT to be used as a foreign tape (see Section 10.2.5).

In order to remove non-VSM tapes, users must obtain property passes from their administrative officer prior to the close of the business day. CIT does not issue property passes for tapes.

10.2.1 Tape Management System Features

Titan uses the TMS/CA1 tape management software system. The system records the tape serial number and the data set name and characteristics in an internal catalog when the cartridge tape is created.

For Information on Your Tapes

- **ISPF Option L.5—Manage** your tapes in Titan's tape database through ISPF Option L.5. (From the CIT/Titan Primary Option Menu, select L for Local utilities/applications, and then select 5—TAPES/NEW.) This tape inventory facility provides immediate feedback about the status of your tapes and allows you to:
  - review tape information by either volume serial number or data set name
  - change expiration dates
  - expire a tape data set by setting the expiration date to the current date
  - request that the entire tape be expired (scratched) by setting the expiration date of the first data set on the tape to the current date

    NOTE: Tapes don't actually become scratch until the morning of the next working day following their expiration dates.

- **ISPF Option 3.4**—View information on cataloged tape data sets by using option 3.4 of ISPF. When viewing a data set list, type TI next to the dataset name to see the volume serial number, the size and format of the data set, plus the creation and last used information. This data is for display only—any updates must be done through the tape inventory panels (Option L.5).

Recreating Tape Data Sets
When recreating a data set on a specific tape volume, the user must observe the following rules:

- The same data set name must be used. Only when the data set name on the DD statement matches the data set name on the cartridge tape label will the expiration date be ignored. TMS will then allow the file to be overwritten.
- DISP=OLD must be specified. (DISP=NEW is used exclusively for requesting a scratch volume to create a new data set or adding a new data set to an existing tape volume).

If both of the above conditions are not met in recreating a data set on a specific volume, a "scratch" volume will be used. The only indication that this has occurred is in the JES2 Job Log at the start of the job output. For a multiple data set tape, the only data set that can be recreated is the last one.

10.2.2 TMS Error Conditions

TMS ABENDs result in a system completion code of the form nEC, where n can be from 1 to 6. Refer to *Titan Batch Processing* for more information on TMS completion codes and messages.

One abnormal situation occurs if a scratch tape is requested for output and TMS does not accept the mounted tape as a scratch tape. TMS issues a "NOT A SCRATCH" message with an accompanying ERROR code and requests another tape. If the situation resulted from improperly coded DD statements, the job will be terminated.

10.2.3 Tape Security

Tape security on Titan is handled by RACF permissions on a data set rather than volume basis. Data set protection depends on the RACF profiles in place and applies to any data set, regardless of whether it is on tape or disk. Users may need to modify their RACF profiles to provide the correct level of access to tape data. In order to have access to data sets on a tape, the user must have the proper access to the first data set on the tape. For RACF processing on the Web, go to:

http://titan.nih.gov

and select RACF.

10.2.4 Foreign Tapes

Foreign (or non-NIH) tapes are those that are supplied by users and are not part of the NIH Computer Center's tape library. Foreign tapes can be used to exchange data with other installations. Any foreign tape that conforms to Titan's normal tape standards may be used. Although the NIH Computer Center does not supply 9-track tapes, there are 9-track tape drives available for mounting foreign tapes.

The TAPEMAP utility program displays the format of the volume, header, and trailer labels of a standard-labeled or unlabeled tape for one or more data sets on a foreign tape. For more information on TAPEMAP, refer to the *Titan Batch Processing* manual.

Check-in Check-out Process

There is a check-in and a checkout process for tracking foreign tapes. Foreign tapes can be checked in for up to a week, to be returned to output boxes the Monday following check-in. To make the most efficient use of tape-drive resources, all foreign tapes are mounted at the

Bethesda campus, although Parklawn users can continue to check them in at the Parklawn building. For information on the courier service, see Section 5.6.1.3.

10.2.5 Purchasing Tapes

To purchase a tape from the NIH Computer Center to be used as a foreign tape, use the Purchase Tape facility at:

http://silk.nih.gov/purchase-tape

To purchase a tape from the former South System inventory, go to:

http://silk.nih.gov/export-tape

10.3 BACKUP/RECOVERY FOR DISTRIBUTED DATA

The NIH Backup and Recovery Service (NBARS) uses TSM (Tivoli Storage Manager) client software, formerly known as ADSM. NBARS allows NIHnet-connected users to back up and recover data stored on LAN servers and desktop computers. TSM clients are available for a variety of platforms, including Windows, Windows 95/98, NT, 2000, XP, Macintosh, Unix, and Linux. This backup/recovery service for distributed data provides an economical, secure, reliable, central mechanism for backing up and restoring data across interconnected LANs, without manual intervention by users. Backed up files are stored and protected in the secure NIH Computer Center facility on a combination of high-capacity disks and tapes.

For More Information

For more information, online registration for NBARS, or free client software, visit:

http://silk.nih.gov/silk/nbars

11 HARDWARE FACILITIES

This section describes the equipment at the central facility for Titan and information concerning other hardware devices used to access the central complex.

11.1 TITAN CONFIGURATION

Titan, the mainframe component of the NIH Computer Center, is an integrated computing facility composed of multiple processors interconnected by over 400 volumes of shared direct access storage and common operating system software. The system has a complement of peripheral devices that include tape drives, communications controllers, and electrographic printing subsystems.

Where possible, the peripheral devices can be manually switched to one or more of the processors. Many devices are also accessed through multiple data channels within a processor. This switching and multiple channel access allow for minimal disruption of service in the event of a subsystem or component failure.

A summary of the major hardware components exercised at the NIH Computer Center follows; additional information may be obtained from the *IBM ESA/390 Principles of Operation*, SA22-7201 and in the various component description manuals. Refer to the hardware and software information at the back of each issue of *Interface* for the current central processor identification numbers. Hardware devices for the IBM mainframe system include the following:

Model	**Item Description**
9672-RB6	Central Processing Units
HDS 9960	Disk Storage Subsystem
3480	Cartridge Tape Drives (18 track, 38,000 BPI)
3490E	Cartridge Tape Drives (36 track, 38,000 BPI)
3422	Tape Drives (6250/1600 BPI)
STK 9310 (Powderhorn)	Automated Tape Library (Silo)
STK 9490 (Timberline)	Cartridge Tape Drives (36 track, 38,000 BPI)
STK VTSS	Virtual Tape Storage Subsystem
STK 9840	Ultra High Performance Magnetic Tape Drives
3900	Laser Printing Subsystems
3160	Cut-sheet Laser Printers
4245	Impact Printers
OSA-2 (Open System Adapter)	Fast Ethernet
5665 NCR Comten	Communications Controller System

11.1.1 External Device and Channel Specifications

The central processors may have a great variety of external devices attached including tape drives, disk drives, printers, and terminals. Data going between the processor complex and the external device passes through a logical path called a channel. Channels are the direct controllers of all input/output devices. They provide the capability of reading or writing data at the same time that actual computing is taking place by relieving the processor complex of the task of communicating directly with the device.

11.1.1.1 Direct Access Device Specifications

HDS 9960 Disk Storage Subsystem (logical 3390**)**

- 50,085 tracks/logical volume
- 15 tracks/cylinder
- 3,339 cylinders/logical volume
- 56,664 bytes/track
- 849,960 bytes/cylinder
- 2.838 gigabytes/logical volume

11.1.1.2 Magnetic Tape Device Specifications

3480 Magnetic Tape Subsystem

- tape cartridge
- 18 parallel tracks
- 38,000 bytes/inch recording density
- high-speed search
- 3 million bytes/second data transfer rate
- dynamic error recovery techniques

3490E Magnetic Tape Subsystem

- cartridge tape and enhanced capacity cartridge tape
- 36 track recording format
- 76,000 bytes/inch data density
- high-speed search
- 4.5 MB per second data transfer rate
- resident error-recovery procedures
- Improved Data Recording Capability (IDRC) feature

3422 Tape Subsystem

- 125 inches/second tape speed
- 6250/1600 bytes/inch recording density
- 3 million bytes/second data transfer rate
- 3 inch inter-block gap (6250BPI)
- 6 inch inter-block gap (1600BPI)

9840 Magnetic Tape Drives

- cartridge tape system - dual-reel inside the cartridge; tape is always enclosed
- tape load point - at the middle of the tape for faster loading and searching
- cartridge external physical form factor - same as 3490E and 3480 cartridges
- 20GB uncompressed cartridge capacity - up to 80GB for highly compressed data
- tape speed - read/write 79 inches per second (IPS); rewind - 315 IPS
- up to 20MB/second data rate for compressed data
- ESCON channel connected to IBM mainframe system
- mostly located within StorageTek Automated Tape Libraries
- separate control unit for each tape drive

9490 Cartridge Tape Drives

- cartridge tape and enhanced capacity cartridge tape
- 36 track recording format
- 76,000 bytes/inch data density
- high-speed search
- 4.5 MB per second data transfer rate
- resident error-recovery procedures
- Improved Data Recording Capability (IDRC) feature

VTSS Virtual Tape Storage Subsystem

- emulates 3490E tape drives
- storage provided by a RAID-6+ DASD configuration

11.1.1.3 Output Device Specifications

3900 Wide Advanced Function Continuous Form Printer

- all-points addressable printing
- 229 pages/minute
- multiple fonts
- graphics capability
- variable spacing
- standard paper size of 11" x 8 1/2" (without easy-strip margins)

3160 Electrophotographic Cut-sheet Laser Printer

- all-points addressable printing
- low-power laser electrophotographic print technology
- speeds of up to 60 impressions per minute in either simplex or duplex mode
- landscape (11 x 8 ½ inch) or portrait (8 ½ x 11 inch) mode on cut-sheet forms with a 3-hole punch option
- resolution of 600 x 600 picture elements (pels)

4245 Impact Printer

- 132 characters/line

- 2000 lines/minute (max) depending on print train use
- 6 or 8 lines/inch vertical spacing
- SN10 character set
- continuous forms

11.2 REMOTE PRINTERS AND WORKSTATIONS

CIT is no longer accepting requests for new BARR/HASP and SNA connections. For alternatives, see Section 6.4.1 for information on submitting jobs by FTP and Section 6.5.4 on the VPS printing service.

A wide variety of bisynchronous workstations have been used as RJE workstations connected to the NIH Computer Center. In general, a bisynchronous workstation that is compatible with any IBM model RJE workstation can be used for remote printing and job entry.

CIT currently supports BARR/HASP Remote Job Entry Workstation package for submitting jobs and data from a remote location and to receive data and printed output at a remote location. BARR/HASP consists of a communications card and program that operates on DOS-based software. BARR/HASP supports the attachment of printers of many different speeds and prices.

For More Information and Deregistration
For additional information or to deregister from RJE service, contact the TASC help desk. You must let TASC know if you discontinue your RJE service to avoid incurring additional charges.

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Titan User's Guide

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